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# TWENTY-SECOND ANNUAL REPORT

OF THE

# SECRETARY

OF THE

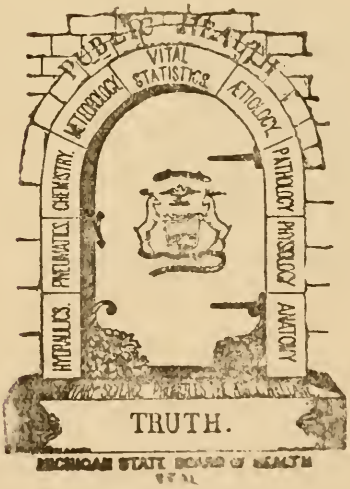
# STATE BOARD OF HEALTH

OF THE

# STATE OF MICHIGAN

FOR THE

FISCAL YEAR ENDING JUNE 30, 1894.



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LANSING
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1896

# RESOLUTION OF THE BOARD RELATIVE TO PAPERS PUBLISHED IN ITS ANNUAL REPORT.

*Resolved*, That no papers shall be published in the Annual Report of this Board except such as are ordered or approved for purposes of such publication by a majority of the members of the Board; and that any such paper shall be published over the signature of the writer, who shall be entitled to the credit of its production, as well as responsible for the statements of facts and opinions expressed therein.

Office of the Secretary of the State Board of Health,
LANSING, MICHIGAN, *Sept. 26, 1895.*

TO HON. JOHN T. RICH, *Governor of Michigan:*

SIR:—In compliance with the laws of this State, I present to you the accompanying Report for the fiscal year ending June 30, 1894.

Very respectfully,

HENRY B. BAKER,

*Secretary of the State Board of Health.*

EXCHANGE U. OF M. DUPLICATE
DEC 5 23

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# REPORT.

## [PART I.]

This is the Twenty-Second Annual Report of the Secretary of the Michigan State Board of Health, and is for the fiscal year ending June 30, 1894. It is arranged in two parts. The first part contains the Secretary's report of the work of the Board, including the programs of sanitary conventions, reports of the examination of plans and specifications of new State buildings, and minutes of regular and special meetings; a report of the work of the office, which includes the Secretary's quarterly reports of work in the office, and brief statements relating to special subjects brought to the attention of the Board,—Michigan Canadian Inspection of Immigrants and Travelers, Proposed Chair of Sanitary Science at the Michigan Agricultural College and the State Normal School, Burning of People in Railroad Wrecks, Use of Atropine in fitting Glasses, The Restriction of Consumption, and Small-pox in Chicago. Then follows the Secretary's annual report of property, including accessions to the library, with names of donors, and financial statements for the calendar and for the fiscal year. It also contains an illustrated account of the Michigan State Board of Health Exhibit at the World's Fair, a paper on "Ventilation" and a paper on "The Causation of Influenza and Allied Diseases," by Henry B. Baker, M. D., Secretary of the Board. The second part contains papers, abstracts and reports,—including one on the "Principal Meteorological Conditions in Michigan in 1893," one on "Time of Greatest Prevalence of Each Disease," being a study of the Causes of Sickness in Michigan especially in 1893; one on the dangerous "Communicable Diseases in Michigan in 1893," —Diphtheria, Membranous Croup, Scarlet Fever, Typhoid Fever, Small-pox, Measles, Whooping-Cough, Consumption, Erysipelas, Puerperal Fever, Rötheln, Chicken-pox, Glanders, Rabies (hydrophobia), Actinomycosis (lump-jaw), alleged Cholera, Cholera Morbus, Trichiniasis, Tonsillitis, Tyrotoxicon; one on "Injuries and Loss of Life and Property from the Use of Kerosene"; one on "Injuries and Loss of Life and Property from the Use of Gasoline", and one on "Alleged Nuisances in Michigan in 1893."

The publication of this Report has been much delayed by several causes, some of which have been operating in preceding years, including the inauguration and prosecution of new lines of work which have seemed to be demanded, such, for instance, as the inspections and disinfections at the Michigan border to keep out small-pox, cholera, etc., and recently the work for the restriction of consumption, and the natural increase of the work, due to increasing population of the State, and more especially to increasing attention to sanitary affairs throughout the State, the office force not having been increased correspondingly.

Under the law, the Secretary of the Board is required to disseminate information "through an Annual Report and otherwise," and, by direction of the Board, he issues immediately after the close of each week, a bulletin which shows the sickness during the week just passed; also a monthly bulletin; and sometimes publishes quarterly proceedings of the work of the Board and the condition of health in Michigan during the quarter. The proceedings of sanitary conventions are published as soon as practicable after the occurrence of each convention. The office disseminates information by means of the telegraph, the telephone, by letter, and especially by means of hektographed statements prepared and distributed to leading newspapers in Michigan. Thus items of sanitary work in Michigan which are regarded as useful "news" are published at once in the comparatively ephemeral bulletins, etc., while the Annual Report is issued, not as a newspaper or journal is, as an ephemeral publication, but as a permanent official record of the work of the State Board of Health, and in the office of the Board, and of the local boards of health throughout the State. The Annual Report contains also statistics which require a great deal of painstaking care in their preparation, but which it is hoped will be useful, for all time to come, to those who study the causation of diseases; and through their labors, to the people of the State and country; and the statistics are there preserved in a permanent form, accessible, for purposes of study, to a comparatively large number of persons.

However, only about six thousand copies of the Annual Report are printed, to supply the two millions and more inhabitants of Michigan; and only 3,500 of those copies are at the disposal of the State Board of Health. Of these, some are sent to libraries, some are sent in exchange for the publications of other State Boards of Health, of prominent city boards of health, sanitary journals, etc.; others are sent to persons likely to make good use of them, including each of the fifteen hundred health officers in Michigan.

To this Report there are three Supplements, containing proceedings and addresses at the Sanitary Conventions held at Hillsdale and Menominee, and at the Second Annual Conference of Michigan Health Officers, held in the State Laboratory of Hygiene at Ann Arbor, June 14 and 15, 1894.

The papers in the Supplements as well as those in this Annual Report, are printed subject to a resolution of the Board, printed on page iv.

The names and postoffice addresses of the members of the Board, and the dates of the expiration of their terms of office, are as follows:

VICTOR C. VAUGHAN, M. D., Ph. D., Ann Arbor, January 31, 1895.
DELOS FALL, M. S., Albion, Jan. 31, 1895.
MASON W. GRAY, M. D., Pontiac, July 1, 1897.
HON. FRANK WELLS, *President of the Board*, Lansing, July 1, 1897.
SAMUEL G. MILNER, M. D., Grand Rapids, Jan. 31, 1899.
GEORGE H. GRANGER, M. D., Bay City, Jan. 31, 1899.
HENRY B. BAKER, M. D., *Secretary of the Board*, Lansing.

The members of the State Board of Health, with the exception of the Secretary, are appointed for the term of six years, and receive no salary or *per diem* compensation for their services.

### STANDING COMMITTEES.*

1. Epidemic, Endemic and Communicable Diseases. — Victor C. Vaughan, M. D.
2. Sewerage, and the Disposal of Excreta.—Mason W. Gray, M. D.
3. Water supply, including purification of sewage-contaminated water. —Prof. Delos Fall, M. S.
4. Buildings, including house drainage, ventilation, heating, etc.— Samuel G. Milner, M. D.
5. Climate, geology, topography and drainage.—Henry B. Baker, M. D.
6. Foods, drinks and their adulterations.—Victor C. Vaughan, M. D.
7. Poisons, explosives, etc.—Prof. Delos Fall, M. S.
8. School hygiene and sanitation.—Samuel G. Milner, M. D.
9. Sanitary inspections in Cities and Villages.—Prof. Delos Fall, M. S.
10. Statistics of Mortality and Sickness.—Henry B. Baker, M. D.
11. Public health legislation.—George H. Granger, M. D.
12. Finances of the Board.—Hon. Frank Wells.
13. Animals' diseases dangerous to man.—Mason W. Gray, M. D.
14. Relations of preventable sickness to taxation.—George H. Granger, M. D.
15. Quarantine at the Michigan border and within the State.—Hon. Frank Wells.

## WORK OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1894.

Aside from the work in committees and in connection with the office of the Secretary of the Board, the work of the State Board of Health itself includes that done by means of sanitary conventions, the examination of plans and specifications for proposed public buildings, under Sec. 7, Act 206, laws of 1881, § 418, Howell's Statutes, amended by Act 86, laws of 1889, and work at regular and special meetings.

### SANITARY CONVENTIONS.

Two successful sanitary conventions were held during the fiscal year ending June 30, 1894, as follows:—

#### HILLSDALE SANITARY CONVENTION, JULY 6 AND 7, 1893.

At the Sanitary Convention held at Hillsdale, the following program was carried out:—

---

* Committees as rearranged by President Wells and approved by the Board, Sept. 29, 1893.

Address of Welcome, by Hon. L. A. Goodrich, Mayor of Hillsdale.

Response and Statement of the Objects of the Convention, by Hon. Frank Wells, President of State Board of Health, Lansing.

President's address, by G. F. Mosher, President of Hillsdale College.

What is being done by the State, and by the United States in the Restriction of Dangerous Diseases, by Hon. Frank Wells, President of State Board of Health, Lansing.

Restriction and Prevention of the Dangerous Communicable Diseases:
  From the Standpoint of a Lawyer, by W. H. Frankhauser.
  From the Standpoint of the Health Officer, by Frank M. Gier, M. D.
  From the Standpoint of a Minister, by Rev. Ransom Dunn, D. D.

General Discussion of the Subject:
  By Prof. Delos Fall, M. S., Member State Board of Health, Albion.
  By Henry B. Baker, M. D., Secretary State Board of Health, Lansing.

Ventilation, by Henry B. Baker, Secretary State Board of Health.
  Discussion of the Subject, by Dr. E. E. Moore, and others.

Drainage: Surface, Subsoil, and Subterranean, by H. P. Parmelee.
  Discussion of the Subject, by Hon. Frank Wells, and others.

Disposal of Waste and Excreta, and its Dangers in Hillsdale, by L. A. Goodrich, Ph. C., Mayor of Hillsdale.

Should Hillsdale have increased Sewerage? by C. F. Cook, Hillsdale.
  Discussion of the Subject, by Dr. Walter H. Sawyer, and others.

Discussion of Subject of School Sanitation, by Prof. W. L. Shuart, and Prof. S. J. Gier.

Achievements of Sanitation Measured by Vital Statistics, by George E. Willitts, Lansing.
  Discussion of the Subject.

Closing of the Convention.

## MENOMINEE SANITARY CONVENTION, APRIL 5 AND 6, 1894.

At the Sanitary Convention held at Menominee, the following program was carried out:—

Address of Welcome, by Byron Taylor, M. D., Mayor of the city.

Response and Statement of the Objects of the Convention, by Hon. Frank Wells, President of the State Board of Health, Lansing.

President's Address, by Byron Taylor, M. D.

The Germ Theory of Disease, by Hon. J. F. Hicks, M. D., Menominee.
  Discussion of the Subject, by Hon. Frank Wells, President of the State Board of Health, Lansing, and by Prof. Victor C. Vaughan, M. D., Member State Board of Health, Ann Arbor.

Restriction and Prevention of the Dangerous Communicable Diseases:
  From the standpoint of the Board of Education, by Hon. B. S Waite, Menominee.
  From the standpoint of the Clergyman, by Rev. F. J. Mallett.
  From the standpoint of the Health Officer, by H. L. Rosenberry, M. D.
  From the standpoint of a Lawyer, by B. J. Brown, Prosecuting Attorney, Menominee.
  From the standpoint of the Press, by H. O. Fifield.
  From the standpoint of the State Board of Health, by Henry B. Baker, M. D., Secretary, Lansing.

The Prevention of Consumption, by H. A. Vennema, M. D., Menominee.
  Discussion of the Subject, by Drs. Hicks, Redelings, and others.

Consumption: Discussion by Henry B. Baker, M. D., Secretary of the State Board of Health, Lansing.

Foul and Noxious Airs, by C. C. Buck, Architect, Green Bay, Wis.

Disposal of Waste and Excreta, by T. J. Redelings, M. D., Marinette, Wis.
  Discussion of the Subject, by Prof. Delos Fall, M. S., Member of State Board of Health, Albion.

School Sanitation, by Mason W. Gray, M D., Member of State Board of Health, Pontiac.

Closing of the Convention.

# EXAMINATION OF PLANS FOR STATE BUILDINGS,—SEWERAGE, VENTILATION AND HEATING,—DURING THE FISCAL YEAR ENDING JUNE 30, 1894.

Act No. 206, Laws of 1881 (§ 418, Howell's Annotated Statutes), as amended by Act No. 86, Laws of 1889, is as follows:

> Plans for buildings, to whom submitted.
>
> 14. SEC. 7. That before the board of any charitable, penal or reformatory institution shall determine on the plan of any building, or on any system of sewerage, ventilation, or heating, which has been authorized by the legislature to be constructed, such plan shall be submitted to the board of corrections and charities and the State board of health for examination and opinion thereon; and the board so submitting such plan shall, in its biennial report, show to what extent it was approved by the boards so examining them. * * * That it shall be the duty of said State boards to visit said penal, charitable and reformatory institutions, when necessary to make the examinations herein required, and their official expenses necessarily incurred shall be audited by the Board of State Auditors and paid from the general fund.—§ 418.

The following are reports concerning plans for public buildings, submitted to the State Board of Health for examination, during the fiscal year 1894:—

## PLANS FOR PROPOSED NEW COTTAGES AT THE EASTERN MICHICAN ASYLUM FOR INSANE, AT PONTIAC.

At the special meeting of the State Board of Health at Lansing, July 28, 1893, on motion of Dr. Baker, it was voted that the order of business be temporarily dispensed with, and that the Board proceed to examine the plans of the proposed new cottages at the Eastern Michigan Asylum.

Dr. C. B. Burr, Medical Supt. of the Eastern Michigan Asylum, and Mr. Anderson, the Supt. of Construction at the Eastern Michigan Asylum for Insane, presented the plans for the new cottages, and verbally explained the plans to the members of the Board, and the Board proceeded to examine the plans.

Dr. Baker asked if the Board desired to approve the common duct for all the ventilating shafts for all the rooms. He moved and it was voted that the Board recommends that each of the stacks for ventilation be divided into two, three, or four compartments, and that the ventilating flues from each part of the building shall go into a compartment on that side of the stack, in order to ensure ventilation on the side of the building opposite the side against which the wind is at the time blowing.

There are no written specifications; but, from verbal statements, the Board understand that the radiators in the basement for indirect heating purposes, and all in occupied rooms and corridors are to be enclosed, and are to receive air from the outside of the building only.

On motion the Board voted that the statement of what the plans show, which is to be prepared by the Superintendent, Dr. Burr, be published with the statement of the report of this Board's action on the plans, in the Annual Report of the State Board of Health.

On motion the plans, with the above recommendations and suggestions, were approved and commended.

HENRY B. BAKER,
*Secretary.*

Here follows a statement prepared by C. B. Burr, M. D., Med. Supt., of the plans for a proposed cottage for men, and a cottage for women,. at the Eastern Michigan Ayslum for Insane, at Pontiac, Michigan.

## EASTERN MICHIGAN ASYLUM FOR INSANE, PONTIAC.

### COTTAGE FOR MEN.

Infirmary for untidy, aged, and epileptic patients, who need careful looking after and night attention, but not nursing attention.

Location: directly west of the Hospital for men, and about 100 feet west of the drive.

Ground covered: 6,336 square feet.

Frontage: due east.

### *Basement.*

Boiler-room: 17x20 feet; ceiling 10 feet; occupying the central portion.

Kitchen: 19x37 feet 6 inches; located in the northwest corner; ceilings 8 feet, 6 inches.

Area and steps at the northeast corner, and from this area, entrance into a corridor, off which are two boot-rooms 10x10 feet each.

Coal-room next to the boiler-room.

Balance of basement occupied by air-chambers in which radiators are located for indirect steam-heating, all taking fresh air either direct from chutes or from unoccupied and tightly closed coil-chambers.

Central chimney starting from the middle of the boiler-room, carrying a smoke-flue if building is heated independently; or warmed by radiators or steam-pipes if building should be heated from the central boiler plant. Heated-air space (area about 9 feet) around central flue, for ventilation. Flues for smoke from fire-places, two each, on first and second floors. Also numerous ventilating flues terminating in the heated space alluded to.

### *First Floor.*

East and west verandas: East, 8x57 feet; west, 8x42 feet.

Day-room, eastern and southern exposure, 36x56 feet; contains two fire-places.

Sun-room connecting, western and southern exposure; 16x16 feet.

The above rooms so arranged as to furnish excellent facilities for observation of patients.

Brick wall carried through the center of the day-room north and south, with openings on each end 13 feet wide and 11 feet high, over which are steel girders to carry the joists of the second floor.

Capacious bath-rooms and clothing-rooms in the northeast corner, apart from the living rooms, and so arranged as to offer facilities for cross ventilation from the east veranda to the north steps.

Large drying-room across the hall from these rooms.

Ventilation from closets, bath and drying rooms to be carried into a heated space about the smoke flue from the kitchen range.

Dining-room, westerly and northerly exposure, 19x37 feet 6 inches.

Attendants' dining-room connecting therewith, 10x13 feet.

One room west from the day-room to be used for sick-room or seclusion-room in the day-time. Dimensions: 10x12 feet.

Hall (which may also be used as visiting-room) west from the day-room, 10x16 feet 6 inches.

From this, a stairway to the third floor.

Another stairway from the corridor in the northeast corner.

Ventilation from portions of the building other than the closets, etc., carried into the heated space about the central stack from the boiler-room.

Heating: For the most part indirect radiation from Gold Pin Radiators in the basement.

Heating flues for the most part in the inner walls. Two exceptions to this on the east side, and one in the sun-room, where special provision is made for carrying a flue inside of the walls under windows and terminating on the first floor, two feet above the floor,—a marble slab covering the top.

Heating flues, 8x12 inches.

Ventilating flues, 8x8 inches.

Ventilation taken from the bottom of all rooms.

Heating flues opening at the top of rooms, 8 feet from the floor.

Ceilings 12 feet high.

### *Second Floor.*

Dormitories over day-room (opening in central wall 16 feet); also over sun-room and dining-room.

Room for two attendants over attendants' dining-room.

Bath-rooms, water-closets and clothes-room corresponding to same on the first floor, and ventilated like these.

Two flues for fire-places in the central stack.

Dormitories so located as to be under the immediate command of the night-nurse.

### *Third Floor* (One-half story in part).

Rooms for attendants and night-nurses.

In half-story part: Galvanized-iron flues connecting with brick flues in the walls at the top of the third story, and terminating in central stack, for ventilation.

Sewage carried into a six-inch vitrified tile connecting with the Hospital sewer. Pipes all of iron in the building. Soil-pipe carried to the roof full size. All traps ventilated. All fixtures to have superficial vents; the pipes from these terminating in the top of the soil-pipe above the highest fixture. Sewer ventilated just outside of the building by a four-inch pipe carried above the highest point of the roof.

Dining-room: Floor surface per patient, 14¼ feet.
" " Cubic feet per patient, 171 feet.
Day-room: Floor surface per patient, 47 feet.
" " Cubic feet per patient, 564 feet.
Dormitories: Floor surface per patient, 62 feet.
" Cubic feet per patient, 744 feet.

## COTTAGE FOR WOMEN.

Located in the orchard, directly east of the Administration Building, and about 100 feet from the easterly portion of the Asylum drive.

Cottage in all essential features like the present East Cottage.

Heating and ventilation the same.

Arrangement of living rooms on the first floor, and dormitories on the second, the same.

(See Report of the Eastern Michigan Asylum for 1888.)

In the plan for this cottage, the woodshed has been omitted, wood and coal being carried into the basement, in that portion which is used in the East Cottage as a laundry.

Heating will be by indirect radiation, and from a Furman or Bates boiler.

Water will be heated by a Wilkes Heater.

Sewage from East Cottage carried into settling basin. (See blue-print.)

Dining-room: Floor surface per patient, 12½ feet.
" " Cubic feet per patient, 138½ feet.
Day-room: Floor surface per patient, 41 feet.
" " Cubic feet per patient, 451 feet.
Dormitories: Floor surface per patient, 56½ feet.
" Cubic feet per patient, 620¼ feet.

## PLANS FOR A PROPOSED COTTAGE IN CONNECTION WITH THE MICHIGAN ASYLUM FOR THE INSANE AT KALAMAZOO.

At the meeting of the State Board of Health at Lansing, July 28, 1893, the Secretary presented "blue-print" plans, and specifications in letters from the Medical Superintendent of the Michigan Asylum, for a proposed cottage. An account of the plans, and of the action of the State Board of Health here follows:—

Michigan Asylum for the Insane,
*Kalamazoo, Mich., July 18, 1893.*

*Dr. Henry B. Baker, Secretary State Board of Health, Lansing, Mich.:*

Dear Doctor:—I transmit herewith plans for a cottage to be erected at "Fair Oaks" at the Michigan Asylum for the Insane at Kalamazoo, for the accommodation of sixty patients, for the inspection and approval of your board. This plan is a modification of the Van Deusen Cottage erected in 1887 and which has proven a very satisfactory structure. It is intended to care for a chronic class of patients who may not be able to enjoy the privileges afforded by an open-door system and this may consequently be a closed-door cottage in distinction from the open-door system which exists in cottages previously erected by this asylum.

This building is to be of brick with extreme dimensions of 116x37½ feet exclusive of porches which are 10 feet wide, and consists of basement and three stories. The basement or cellar extends under the entire building, and is 8 feet high in the clear with a cement floor throughout. This height is necessary in order that a boiler for heating purposes may be set up, without placing it far beneath the floor, and have the water line below the level of the radiators. By reference to the basement plan, it will be observed that the rear portion is given up to a boiler room, coal room and cellar which are shut off entirely from the other part of the basement with the exception of one door connecting from the boiler room into the forward part. All radiators are situated in the forward part and their locations shown on the plan. The accompanying figures 1, 2, and 3, show the respective stories in which the flues from them open. By reference to the floor plans it will be seen that each room used as a living room has a fire place. Apart from this there will be additional ventilating flues for the larger rooms as indicated. The ventilators for the second floor will take the place in the wall occupied by the heating flues which terminate below. The same will be true of the third in relation to the second floors. The entire forward part will be used as a cold air chamber into which fresh air is introduced through the windows. If, however, in any particular case this is not found to work entirely satisfactorily, trunk flues leading directly from the outside air to the radiator can be used. In other cottages built by this institution this plan prevails and is eminently satisfactory.

By reference to the plan it will be seen that the first story contains vestibule, reception or sitting room, parlors which are day rooms for patients, hallway, attendants' room, dining room, kitchen, lavatory, pantry, wardrobe, bath room and water closet.

The relative locations and area are shown. This story is 11 feet in the clear.

The second floor occupied by hall and sitting or day room, attendants' room, dormitories, wardrobe and water closet as shown in the plan. This story is 10½ feet in height and will accomodate 32 beds.

The third or attic story, has a sitting or day room, attendants' room and dormitory accommodations for 28 beds. Each room in the house intended for living or sleeping purposes, contains a fire-place in which, if necessary, can be built an open grate fire.

Chimneys are 8 inches square and will furnish ventilation for each room that is not additionally provided with ventilating shafts. The various ventilating shafts before referred to are 4x12 inches in size. These shafts will be collected in the attic into groups of three into a common flue which they will enter at different points and through which the foul air will be conducted out through the roof. The rooms are warmed by air heated by passing over Gold Pin radiators and coming through conduits 12 inches in size. The register openings are 8 feet from the floor and will not be obtructed by gratings. The floors will be of oak and the finishing of oak, butternut, pine and white wood.

The water closets will be supplied with diamond hoppers flushed from automatic tilting cistern which will be supplied with water from an elevated tank and system of water works about to be installed for the entire cottage plant. The plumbing will be done by the asylum engineer and will be appropriately trapped, ventilated, and constructed after the most approved sanitary plans.

The sewage will be carried through an appropriately laid pipe into a system of sewerage being constructed for the entire cottage plant.

This cottage is believed to be planned to afford the best results and being the fifth large house erected by this asylum, our object has been to avoid defects in construction, heating and ventilation that may have entered into former constructions. The house will be plain throughout but very substantially built. The windows of the second and third floors will be protected by light wire guards permanently attached from the outside.

The basement wall will be of stone, the first three feet laid in cement. The brick of good quality, properly laid and the roof of good quality purple slate. As before indicated, the house will be heated by indirect steam radiation. Steam will be furnished from a horizontal, tubular boiler set in brick with all necessary devices to insure safety, efficiency and economy. Hot water will be furnished for bathing and other purposes from a Richardson and Boynton or other suitable hot water heater.

The appropriation for the construction of this cottage is $15,000.00 and it is confidently expected that it will be built within this amount.

Wm. M. Edwards,
*Medical Superintendent.*

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Michigan Asylum for the Insane,
*Kalamazoo, Mich., July 26th, 1893.*

*Henry B. Baker, M. D., Sec'y State Board of Health, Lansing, Michigan:*

Dear Doctor:—Your letter of July 19th is received.

The sewage from our cottage will flow through an iron pipe until outside the walls of the building and then through a six-inch glazed sewer pipe, manufactured in Akron, Ohio, with joints cemented throughout. We have at the "Pratt" Cottage a system of sewerage known as the Intermittent Sub-surface System, consisting of a collecting tank divided in two compartments, from the larger of which the sewage is discharged by a siphon, carried to a distributing field and spread immediately under the ground. It is the same system that has received so much attention from the Massachusetts State Board of Health during the past few years. This has now been in operation for a year and is entirely satisfactory. We are at present building a similar system that will dispose of the sewage from the Van Deusen Cottage, the Palmer Cottage and the one now in construction. The location of the cottages, the field of discharge, etc., will be understood from the blue-print map that I send you herewith. The distributing area will be underdrained with tiles and any surplus water will be carried into a smaller stream and away. The entire system is put in under the direction of Mr. George S. Pierson, Civil and Sanitary Engineer of Kalamazoo.

I am very truly yours,
Wm. M. Edwards, *Med'l Sup't.*

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Michigan Asylum for the Insane,
*Kalamazoo, Mich., Aug. 8, 1893.*

*Dr. Henry B. Baker, Sec'y State Board of Health, Lansing, Michigan:*

Dear Doctor:—Your letter of July 29th and the blue-print plans of our cottage returned, are received. I have indicated on the plans the location of the ventilating flues on the second and third floors and have marked the hot air exits as you request. I also send you in the same package, a blue print of the scheme for plumbing. You will notice that each fixture is trapped with a full S trap and each trap ventilated with a two-inch pipe into the back air pipe. A soil pipe will extend above the roof full sized and its top will be unobstructed. An outside ventilating pipe, four inches in size, will also extend up through the roof. The bath tub and sink which stand on the same level with the stools will each be trapped. The ventilating pipe from each trap will extend above the highest fixture.

I am very truly yours,
Wm. M. Edwards, *Med'l Sup't.*

The following is the action of the State Board of Health:—

At the meeting of the Board July 28, 1893, the plans and specifications were examined, and it was voted that the Superintendent of the Asylum be requested to state the amount of provision for ventilation in rooms on the first and second floors, and indicate on the plans the fresh-air inlets and the foul-air outlets. Also whether the sewers are to be properly trapped at each building, so that each is independent of each other; whether all traps are ventilated, and whether ventilating pipes from traps on fixtures extend above the roof.

On motion it was voted that when the above information is obtained and found satisfactory, the plans be approved.

(Accordingly a letter has been received from Dr. Wm. M. Edwards, Med. Supt., and the information is satisfactory.)

HENRY B. BAKER,
*Secretary.*

## PROPOSED DISPOSAL OF SEWAGE AT STATE HOME FOR FEEBLE MINDED, LAPEER, MICHIGAN.

This subject was not submitted to the State Board of Health.

The following is a report of those members of the Board who were invited to make an examination. The report was based upon examination of the stream, and upon representations made by prominent citizens of Lapeer, as to its condition at time of examination compared with its condition for many years past.

[Copy.]

*Lapeer, Mich., Dec. 12, 1893.*

*To Hon. C. G. Luce, J. C. Sharp, and L. A. Sherman, Commissioners for the Location of a Home for the Feeble Minded:*

GENTLEMEN:—We, undersigned members of the State Board of Health, having been asked by you to express an opinion as to the capability of the stream known as Farmer's creek of carrying off the sewage of the proposed home with a supposed colony of one thousand persons, would respectfully submit the following answer:—

This stream will carry the sewage of the proposed home, without detriment to the health of those living along its banks provided that said stream be straightened. The city of Lapeer should obligate itself to make these changes subject to your approval before the proposed location is accepted.

VICTOR C. VAUGHAN,
GEORGE H. GRANGER,
HENRY B. BAKER.

## PLANS AND SPECIFICATIONS OF THE UPPER PENINSULA ASYLUM FOR THE INSANE, AT NEWBERRY, MICHIGAN.

At the special meeting of the State Board of Health, at Lansing, June 1, 1894, for the examination of the plans and specifications of the proposed Upper Peninsula Asylum for the Insane, at Newberry, Michigan, no quorum of the Board was present. Hon. Frank Wells, president, Lansing, and Henry B. Baker, secretary, Lansing, were the only members present. Hon. Claude W. Case, Dr. George L. Loope, and Dr. Henry W. Jones, members of the Board of Building Commissioners for the proposed Asylum, were present to explain the plans and answer any questions which might be asked. The plans and specifications were examined by the president and secretary of this Board, and their recommendations were afterwards approved by the Board. An account of the plans, and of the action of the State Board, here follows:—

OFFICE OF CLAUDE W. CASE,
*Newberry, Michigan, June 12, 1894.*

*Dr. Henry B. Baker, Sec'y State Board of Health, Lansing, Mich.:*

MY DEAR DOCTOR:—Agreeable to your request of the 1st inst., I have pleasure in giving you hereunder the information which has been supplied by Messrs. Charlton and Gilbert, architects.

### UPPER PENINSULA ASYLUM FOR THE INSANE, NEWBERRY, MICH.

*Details of Heating, Ventilation, Sewerage, Plumbing, etc.*

*Heating.* Principally by indirect radiation (hot fresh air) with a certain amount of direct radiation.

*Indirect heat.* (Hot fresh air) is distributed into the different floors from all four sides of the buildings.

*Height of hot air inlets*, 7' 0" above floor levels.

*Fresh air* to indirect boxes is taken 1' 0" above grade and protected with wire screens.

*Foul air flues* are taken from the floor levels and are carried up (each separately) to top of roof; each will be furnished with steam pipe in same, to overcome extreme density in the outside atmosphere, or in case of emergencies.*

These flues are taken as much as possible from under the windows and are carried up in the inside walls.

*In each Cottage.*

Total number of fresh-air flues, 23; size, 8 x 12.
" " " foul-air " 45; " 8 x 8.

*In Laundry.*

Total number of fresh-air flues, 8; size, 8 x 12.
" " " foul-air " 8; " 12 x 16.

*Sewer, etc.*

Sewerage is conducted from buildings to village sewer by a 6-inch glazed socket pipe, having a fall of 100 ft. in 10,000 ft.

Sewerage of each separate building conducted to main sewer by 4" cast-iron pipe.

All soil pipes extra heavy 4", carried up above roof by 6" pipe.

All fixtures trapped generally with the Bennor trap and ventilated into separate 2 cast-iron pipe, carried up above roof by 4" pipe.

Large grease traps (ventilated) provided to all sinks.

All closets and urinals flushed with 1-minute time automatic flush, each provided with local vent.

Trusting that we have fully understood and supplied your requirements in this matter, I beg to remain,

Yours very truly,

CLAUDE W. CASE,
*Chairman.*

The following recommendations were made by the members present:—

That all foul-air outlet registers be placed at the floor level; and, whenever practicable, the foul air be taken out by a register under the window, and under the floor to the ventilating shaft which shall go up on an inside wall.

That the dining room be heated by the indirect method, and the foul air be taken out of the dining room in the same manner as from other rooms, having the foul-air registers at the floor level.

The air supply should be not less than 2,000 cubic feet of fresh air to each occupant, each hour. It was stated by those submitting the plans that a larger supply was provided for.

In general the plans were approved, and commended for their neatness and completeness.

At a special meeting of the State Board of Health held at Ann Arbor, June 15, 1894, the foregoing report of the officers of the Board was on motion confirmed.

HENRY B. BAKER,
*Secretary.*

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* [The steam pipes are placed in the ventilating shaft to cause upward motion in the shaft at such times as the out-door and in-door temperatures are so nearly the same that, without heat in the ventilating shaft, no such upward motion could occur.—H. B. B., Sec.]

# MEETINGS OF MICHIGAN STATE BOARD OF HEALTH, FISCAL YEAR ENDING JUNE 30, 1894. ABSTRACTS AND BRIEF ACCOUNTS OF THE PROCEEDINGS.

## SPECIAL MEETING AT HILLSDALE, JULY 6, 1893.

A call was issued for a meeting of the Michigan State Board of Health during the Sanitary Convention at Hillsdale, July 6 and 7, 1893; but, as Mr. Wells, Prof. Fall and Dr. Baker were the only members present, there was no quorum and consequently no meeting.

## SPECIAL MEETING AT LANSING, JULY 28, 1893.

The call for this meeting stated that it was for 10:30 A. M., July 28, but at that time only the President and Secretary were present. At 11:05 Dr. Mason W. Gray came in. At 3:30 P. M., a quorum was present. The members present were Hon. Frank Wells, President, Lansing; Mason W. Gray, M. D., Pontiac; Samuel G. Milner, M. D., Grand Rapids; and Henry B. Baker, M. D., Secretary, Lansing.

On motion of Dr. Baker it was voted that the order of business be temporarily dispensed with, and that the Board proceed to examine the plans of the proposed new cottages at the Asylum for Insane at Pontiac.

[A statement of this examination will be found printed on pages xi–xiii of this Report.]

Dr. C. B. Burr, Medical Supt. of the Eastern Michigan Asylum, and Mr. Anderson, the Supt. of Construction at the Eastern Michigan Asylum for Insane, presented the plans for the two proposed new cottages, and verbally explained the plans to the members of the Board.

The plans were examined by the members of the Board.

Dr. Baker asked if the Board desired to approve the common duct for all the ventilating shafts for all the rooms? He moved and the Board voted that this Board recommends that each of the stacks for ventilation be divided into two, three, or four compartments, and that the ventilating flues from each part of the building shall go into a compartment on that side of the stack, in order to ensure ventilation on the side of the building opposite the side against which the wind is at the time blowing.

There were no written specifications; but, from verbal statements, the Board understand that the radiators in the basement for indirect heating purposes, and all in occupied rooms and corridors are to be enclosed, and are to receive air from the outside of the building only.

On motion the plans, with the above recommendations and suggestions, were approved and commended.

On motion of Dr. Baker, the Board voted that the statement of what the plans show, to be prepared by the Superintendent, Dr. Burr, be published with the statement of the report of this Board's action on the plans, in the Annual Report of this Board. [Printed on pages xii–xiii of this Report.]

Mr. Wells, the president, remarked that at some opportune time in the future he would probably call the attention of the members of this Board to the important duties they were supposed to perform. He thought that the members should do more work, and take more interest in the work of the Board. He mentioned that every member of the Board should have been present at this meeting, but it was with difficulty that a quorum was present for a short time.

The Secretary presented and read the minutes of the regular meeting of the State Board of Health, at Lansing, April 14, 1893, and the minutes were approved as read by the Secretary.

The Secretary presented and read the minutes of the special meeting of the Board at Stanton, April 27, 1893, and the minutes were approved as read.

The Secretary presented and read the minutes of the special meeting of the Board at Ann Arbor, June 15 and 16, 1893. The minutes were approved as read.

The Secretary stated that at the special meeting of this Board called to meet at Hillsdale during the Sanitary Convention, July 6 and 7, there was not a quorum present. The members present were Hon. Frank Wells, President, Prof. Delos Fall, M. S., and Henry B. Baker, M. D., Secretary.

State Board of Health vouchers numbers 2283 to 2289 and 2298 to 2325, inclusive, were allowed by the Board.

The Secretary was requested to find out the reason why this Board is charged ten dollars for the late edition of the Medical and Surgical Register, when physicians are paying only five or six dollars for the same book.

Dr. Gray left to reach his train at 5:30 P. M.

Plans and specifications (in letters) for the proposed new cottage at the Asylum for the Insane at Kalamazoo, were then examined. [A statement of the examination will be found printed on pages xiv–xv of this Report.]

It was voted that the Superintendent of the Asylum be requested to state the amount of provision for ventilation in rooms on the first and second floors, and indicate on the plans the fresh-air inlets and the foul-air outlets. Also whether the sewers are to be properly trapped at each building, so that each is independent of each other; whether all traps are to be ventilated, and whether ventilating pipes from traps on fixtures extend above the roof.

On motion it was voted that when the above information is obtained and found satisfactory, the plans be approved.

[Accordingly a letter has been received from Dr. William M. Edwards, Med. Supt.; and the information was satisfactory.]

The Board then adjourned.

HENRY B. BAKER,
*Secretary.*

### SPECIAL MEETING AT LANSING SEPT. 29 AND 30, 1893.

*Evening Session, Sept. 29, 1893.*

The meeting was called to order at 7:33 P. M., by the President, Mr. Wells. The following members answered the roll call:—Hon. Frank Wells, President, Lansing; Prof. Delos Fall, M. S., Albion; George H. Granger, M. D., Bay City; and Henry B. Baker, Secretary, Lansing. Dr. Samuel G. Milner, of Grand Rapids, came in at 8:05 P. M.

The Secretary read the minutes of the Special Meeting of the Board at Lansing, July 28, 1893, which were approved as read.

State Board of Health vouchers numbers 2326-2347, inclusive, were presented, read by the Secretary and allowed by the Board.

Secretary Baker read a brief announcement of items of business which he wished to present to the Board at this meeting.

Dr. Vaughan's letter stating that he would probably not be present at the meeting, was read by the Secretary.

On motion of Prof. Fall the Board voted to request the Secretary, in the future, to have copies made of the stenographic reports of remarks, discussions, etc., by members of this Board, at Sanitary Conventions, and sent to the members making the remarks, for editing, before the "Proceedings of the Convention" is published.

The president presented a proposed list of standing committees, changed slightly from the list heretofore in use.

The subject was discussed, and finally the list was still further amended and adopted.*

The Secretary presented and read portions of his quarterly report of work in the Office, for the quarter ending with Sept., 1893. [This Quarterly Report of work is printed on subsequent pages of this Report.]

In connection with the distribution of pamphlets of instruction relative to the restriction and prevention of dangerous diseases, Dr. Granger mentioned that in his part of the State considerable difficulty was experienced in enforcing the law, and in obtaining the coöperation of the foreign population, because they did not believe in the contagiousness of some of the dangerous diseases. Dr. Granger asked if the pamphlets relating to the restriction of dangerous diseases were printed in lanugages other than English.

The Secretary replied: Yes; and I have here a proposition to reprint several of these leaflets, as they are nearly out of print.

Dr. Granger said that the Board had done much good work in the distribution of these instructive pamphlets to the neighbors of the persons sick with a dangerous contagious disease. The foreigners are hard to control, and would hold public funerals in cases of death from dangerous diseases, and other such dangerous performances, were it not for the efficient boards of health throughout the State.

On motion of Dr. Baker, it was voted that the leaflets in foreign languages be reprinted, to meet the demand for distribution about the State.

Dr. Baker presented the subject of the Michigan State Board of Health declaring Consumption, and other diseases due to the tubercle bacillus, "diseases dangerous to the public health," and said that he believed that the board had not for years taken a step so important as this proposed step, and he hoped they would consider the subject and take decisive action.

Dr. Granger said that he most emphatically supported Dr. Baker's proposal, as he believed the step an important one, and in the right direction.

Members generally thought the proposed action important, and believed the action should be in the form of a resolution, and that action should wait until the morning session, when each member would have had a chance to think the subject over and formulate some resolution, and come to some decision as to what the proper action should be.

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* This list will be found on page ix of this Report.

On motion of Mr. Wells the board voted to request Prof. Fall to prepare circulars, leaflets, etc., relative to the restriction and prevention of consumption, for presentation to the Board at its next meeting.

Secretary Baker read a letter from Secretary C. N. Metcalf, M. D., relative to small-pox in Indiana, and mentioned that there might be need to quarantine against Indiana. In connection with this subject, the Secretary moved, and with amendments it was voted, that a committee consisting of the President and Secretary, be appointed to frame rules for internal quarantine, under Act 47, Laws of 1893.

The Secretary read a circular from the Secretary of the National Conference of State Boards of Health, relative to Annual dues, extra copies of the Proceedings of the meeting at New York, etc. The circular stated that six hundred copies of the proceedings would be distributed among the boards which are members of the Conference, and it was decided that the Board would probably need no extra copies.

The Secretary presented the question whether the Secretary of the Board would be authorized to purchase one Edison's Phonograph for use in the Office, provided that in his judgment after testing the question the machine was a practical one for use in the Office. Members thought the machine might be tried, and the subject of buying could be presented afterward.

The Secretary presented and read a portion of a compilation of facts prepared relative to diphtheria in Alcona Co., Huron Co., and other counties, reported to have originated from "Camp 8," in Millen township, Alcona Co. He also read a report of the investigation, by Dr. Hauxhurst, of this outbreak of diphtheria at "Camp 8;" and, on motion of Dr. Granger, the Board voted to have the facts relative to this outbreak printed in the Annual Report of the Board.*

Dr. Baker presented and moved the publication of a letter from Prof. Fall relative to a trip into the country with Dr. Parmeter of Albion to look into the facts relative to the alleged pollution of Michigan's water supplies by artesian wells being used for the drainage of marshes, barnyards and other foul places. The Board voted that Prof. Fall's letter, and other facts relative to this subject, be printed in the Annual Report of this Board.†

The Board voted that two of Secretary Baker's papers, one on "Past and Present Sanitary Progress in Michigan,"‡ read before the State Eclectic Medical Society, and the paper on "Ventilation" read at the Hillsdale Sanitary Convention, be printed in the Annual Report.¶

Secretary Baker read a letter, dated Sept. 27, which he had received from Dr. Walter Wyman, Supervising Surgeon General U. S. Marine Hospital Service, relative to the methods of disinfection of baggage by U. S. Marine Hospital Service officers at St. Lawrence Quarantine.

Mr. Wells said that the committee on quarantine, the Secretary and himself, had many important questions to act upon, and he wished to know if the Board still stood as a unit in sanctioning the action of this committee in the future, and the actions in the past. The members all signified that they did.

On motion of Dr. Granger the Board took a recess until 8:30 A. M., Standard Time, Sept. 30.

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* Printed on subsequent pages of this report, in connection with the article on "Diphtheria."

† Printed on pages l-li, Report of this Board for 1893.

‡ This paper is printed on pages cxiii-cxxiv of the Report of this Board for 1893.

¶ This paper will be found printed on subsequent pages of this report.

### *Second Session, Sept. 30, 1893, at 8:33 A. M.*

The following members answered to roll call: Hon. Frank Wells, President, Lansing; George H. Granger, M. D., Bay City; Samuel G. Milner, M. D., Grand Rapids; Prof. Delos Fall, M. S., Albion; and Henry B. Baker, Secretary Lansing.

The Secretary presented a resolution which he had prepared relative to the Board placing Consumption in the list of "diseases dangerous to the public health." Dr. Granger also presented a resolution relative to the same subject.

Dr. Milner thought this action of the Board should be deferred.

Dr. Baker replied that he hoped that the subject would not be deferred, because the Board would be criticised if it did not take action on this disease, as he thought that on this subject the Board was probably behind the views of many of the practitioners throughout the State. The State Board of Health should take some step in the right direction for the restriction of consumption, even if the action is not complete or perfect. He thought lives were to be saved by such action.

On support of Dr. Granger, Dr. Baker's resolution relative to consumption, as amended, and subject to minor changes by the Secretary, was unanimously adopted by the Board. The resolution is as follows:—

*Resolved*, That hereafter, consumption (and other diseases due to the *bacillus tuberculosis*) shall be included in the official list of "Diseases dangerous to the public health," referred to in sections 1675 and 1676 Howells Statutes, requiring notice by householders and physicians to the local health officer, as soon as such a disease is recognized.

The President suggested that the circular, leaflet or pamphlet to be prepared by Prof. Fall in connection with the restriction of consumption, be presented to the Board at its next meeting; and, in the mean time, the pamphlet already printed, be used for distribution.

President Wells suggested that a copy of the above resolution and a copy of the pamphlet relating to the prevention of consumption be sent to each health officer in Michigan.

On motion of Dr. Baker the Secretary was directed to print the Proceedings of this meeting, in pamphlet form, for distribution.

The Secretary presented a proposal for a revision* of the Rules for inspection of immigrants and travelers at the Michigan Border, and on motion the Board voted to amend the rules, subject to the opinion of the attorney general, as follows: Rule 1 was amended by adding to it the words—"and no immigrant shall come into this State, or travel within the State, until inspected under these rules, and until authorized to do so by an inspector appointed or accredited by the Michigan State Board of Health."

Rule 5 was amended so as to hold immigrants until their baggage has been disinfected.

An additional Rule was adopted as follows:

Rule 7. Dangerous communicable diseases being now present in every country from which immigrants are coming into Michigan, no immigrant, and no traveler or other person believed by the State Board of Health, or its authorized inspector, to have been exposed to and liable to convey cholera, diphtheria or other dangerous communicable disease, shall pass through Michigan, or from one township, city or village to another within the State, without permission from the State Board of Health or its authorized inspector.

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* The revised edition of these Rules is printed on subsequent pages of this Report.

The Secretary presented, read and the Board allowed accounts as follows:—

| | | |
|---|---|---|
| George H. Granger, | expenses in attending this special meeting... | $6.80 |
| Samuel G. Milner, | " " " " ... | 6.25 |
| Porf. Delos Fall, | " " " " ... | 4.80 |

On motion the Board voted that, should any other member arrive later, when no quorum was present, his expenses in attending this special meeting, be allowed subject to his certificate, and the certificate of the President and Secretary of the Board shall be affixed, as usual.

Dr. Samuel G. Milner left at 10:20 A. M. to catch his train.

Dr. Granger presented a resolution which was slightly amended, adopted, and read as follows:

*Resolved*, That it is the will of this Board that the President and Secretary continue to take such action as may be necessary to enforce the Rules of this Board, and to enforce quarantine at the Michigan border and within the State against diseases dangerous to the public health, and to compel any railroad company operating within the State to obey the State laws and the Rules and regulations of the State Board of Health made under the law.

Dr. Geo. H. Granger left at 10:37 A. M. in order to take the train for Bay City.

The Secretary read a letter dated Sept. 29, relative to the sealing of baggage by the inspectors at Detroit, and relative to disinfection of baggage at Detroit.

The Secretary read a letter, of Sept. 28, from Dr. J. K. Niven, health officer of Ironwood, relative to the status of the typhoid fever outbreak in that city.

The Board adjourned at 12:00 noon, Sept. 30.

### SPECIAL MEETING AT LANSING, OCT. 27 AND 28, 1893.

Oct. 21 a call for a special meeting of the State Board of Health was issued by the President of the Board, to meet in Lansing, Oct. 27, to confer and take action relative to "immigrant inspection and disinfection of baggage and any other business which may properly come before the special meeting, including the auditing of bills."

The meeting was called to order by the President, at 7:24 P. M., Oct. 27, and the following members answered to roll call:—Hon. Frank Wells, President, Lansing; Victor C. Vaughan, M. D., Ann Arbor; Prof. Delos Fall, M. S., Albion; and Henry B. Baker, M. D., Secretary, Lansing. (Dr. Samuel G. Milner, of Grand Rapids, came in and took his seat as member of the Board, at 8:00 P. M.)

On motion of Prof. Fall, it was voted that the reading of the minutes of the last meeting, be dispensed with.

State Board of Health vouchers, numbers 2351–2365 inclusive, were allowed.

Dr. Samuel G. Milner, of Grand Rapids, came in at 8:00 P. M. and took his seat as a member of the Board.

Under the item of business entitled "Communications by the President," Mr. Wells said:—

The State of Michigan is now paying out a large sum of money every month for quarantine service along the Michigan border, and I thought I should like the Board to know the exact situation. The system is now and has been, very satisfactory, as far as it can be, with the exception of the inspection at Sault Ste. Marie. At the Soo some of the baggage of immigrants is being disinfected on the Canadian side, but disinfection of the remaining baggage is not being done on the American side. The questions which this Board should decide at this meeting are: whether or not the inspection should be continued, and whether or not we should accept the certificates of the Canadian authorities. We heard what Dr. Montizambert had to say at Chicago, and I think all who heard him believe that his certificates could be relied upon; and I believe that this question should be considered by the Board, and Dr. Montizambert's certificate accepted at the Michigan border. Cholera is now abating in Europe and I doubt if the citizens of Michigan will sustain this Board any longer in the expense incurred in quarantine at the Michigan Border, so I have taken the responsibility upon myself to call this special meeting of the State Board of Health.

The Secretary presented and read a number of items of business which he wished to bring before the meeting.

Dr. Vaughan made a motion that this State Board of Health commend the Canadian Government for the disinfection of the baggage of all immigrants, and condemn the United States Government for not disinfecting the baggage of all immigrants.

Dr. Baker said that he would be more glad to vote for the foregoing resolution if he was not aware of what Dr. Montizambert had been doing, and had done privately and openly at Washington during the meeting of the Pan-American Medical Congress, in Sept. last. He said that Dr. Motizambert was then telling all he met that this Board was maintaining quarantine for other than sanitary purposes, implying that it was for blackmail, thereby tending to injure this Board in the opinion of the members of the Pan-American Association, the Sanitary Section of which was probably the largest body of representative sanitary officials that ever met in this country. Dr. Baker said that Dr. Montizambert openly denounced this Board at the Washington meeting, and now the Michigan State Board of Health seemed to want to commend him for his actions.

Dr. Vaughan said that he thought the question which should be decided by the Board at this meeting, was whether or not the quarantine on the Michigan frontier should be continued; and, in order to hear from the members, he moved that the Board discontinue the State quarantine at the Michigan border. Prof. Fall supported Dr. Vaughan's motion.

Dr. Baker said that with reference to cholera alone, he believed the quarantine inspection should be continued.

Dr. Vaughan moved that the Board withdraw the inspectors along the Michigan border provided that the inspection and disinfection by the U. S. Inspectors is done in accordance with Michigan rules. The motion was not acted upon at this time.

Mr. Wells: As far as cholera is concerned, I would discontinue the quarantine inspection on the Michigan border very soon; but, if we wish to protect the citizens of Michigan from other diseases, I would continue the quarantine. I believe that if an immigrant was affected with cholera, he would be stopped before he reached the Michigan border. Unless we are to disinfect the baggage of all immigrants in order to keep out other dangerous disease than cholera, I should think the quarantine inspection and disinfection could just as well be discontinued.

The Secretary read the Abstract of Proceedings of the Jan., 1893, meeting of the Board, relative to lessened sickness from nearly all diseases in the fourth quarter of 1892, attributable in part to the disinfection of baggage on the Michigan border. He read also from the proceedings of the last regular meeting that "no disease was more than usually prevalent in the third quarter of 1893," Notwithstanding the large immigration, the cholera abroad, and the small-pox in some of the United States, notably in one adjoining State—Indiana.

Prof. Fall: I believe that if we were to disinfect the baggage of all immigrants the year around, it would be better for Michigan, but I don't believe the citizens of Michigan are ready for such a move, or would uphold this Board in incurring any such expense.

Dr. Baker: One has only to watch the Finns come into this State to see where small-pox has been and is prevalent. At the "Soo" last July I noticed that a large proportion of the faces of the Finns was pitted with small-pox. Consumption is very prevalent among the Scandinavians, diphtheria among the Germans, and measles among the English. Michigan does not have small-pox unless the disease is brought into the State. If we allow measles to be brought into the State of Michigan, in a short time Michigan will probably have as large a death-rate from measles as is experienced in England. If this Board was to quarantine only against the introduction of measles, it would pay for the expense of the inspection and disinfection.

On motion of Dr. Vaughan, it was voted that the quarantine inspection along the Michigan border be continued.

Dr. Vaughan offered the following resolution:

*Resolved*, That immigrant baggage bearing the certificate of inspection and disinfection from Grosse Isle quarantine authorities, showing that it has been disinfected, be admitted to enter Michigan without further disinfection at the border, unless there is reason to believe that this baggage is liable to be infected since leaving the port of entry.

The foregoing resolution was supported by Prof. Fall; but, on consent of Prof. Fall, Dr. Vaughan temporarily withdrew the resolution.

Prof. Fall presented the following resolution, on which no formal action was taken until the morning session:—

*Resolved*, That the action of the Dominion of Canada in disinfecting the baggage of all immigrants from Europe coming into its territory and the establishment of its splendid appliances for this purpose as described by Dr. Montizambert, at the recent meeting of the American Public Health Association at Chicago, meets our most hearty approval. We commend earnestly this action of Canada to the U. S. Government and hope that similar disinfecting plants will be established by it at U. S. Atlantic ports, and that the baggage of all immigrants to this country will be disinfected. We ask that this be done not alone that we may be saved from threatened invasions of small-pox and cholera, but also that a vastly greater saving of lives may be effected from measles, diphtheria, scarlet fever, pneumonia, consumption and other diseases which are of more serious concern to the people of this country than cholera or small-pox.

By unanimous consent, the Secretary presented and read a Report* on immigrant inspection, and the disinfection of immigrant baggage on the Michigan border. No action was taken on this report. The President, however, corroborated one of the statements of the Secretary that a fault of the present quarantine law, Act 47, Laws of 1893, was that the penal clause provided so small a penalty that a case of disobedience of rules comes before a petit jury.

On motion of Prof. Fall, it was voted that the officers of the Board take proper steps to bring the subject legally before Judge Steere, of the eleventh judicial circuit, or the proper court, with a view to deciding whether or not Act 47, Laws of 1893, is constitutional.

President Wells inquired of the members how long they expected the committee to continue the quarantine. Although no formal action was taken, it was apparent that the members expected the quarantine to be continued until the next regular meeting of the Board.

On motion, the Board adjourned at 11.03 P. M., to meet again at 8:00, Standard Time, the next morning—Oct. 28, 1893.

### *Morning Session, Saturday, Oct. 28, at 8:07 A. M.*

Drs. Vaughan, Milner, and Baker, and Prof. Fall and Mr. Wells answered to the roll-call at the morning session.

The following preambles and resolutions were presented and read by Dr. Baker, and informally discussed:

*Whereas*, Michigan has been remarkably favored by comparative immunity from dangerous diseases during the past year while cholera has been and still is prevalent in most European countries, and small-pox and other dangerous diseases have also been and small-pox still is prevalent in some of the United States, and

*Whereas*, It is believed that this comparative immunity from disease in Michigan has been largely due to enlightened efforts by sanitary officials, governments, corporations, and individuals, not only in Michigan, but in our neighboring Dominion of Canada, in the States eastward of Michigan, in the United States Government, and in foreign countries, and

*Whereas*, This Board deems it wise to recognize these facts, to govern our future action accordingly; and to commend those agencies which tend toward the welfare of our own people, therefore

*Resolved*, That the Michigan State Board of Health commends the action of all those individuals, corporations, communities, and sanitary officials in Michigan, who have wisely done what was practicable to be done toward the prevention of the introduction or spread of disease in our midst, whether such action was sanitary surveillance of immigrants, sanitary inspections of premises, abatement of nuisances, or the prompt restriction of a dangerous disease.

*Resolved*, That the action of the government of the Dominion of Canada, in providing for the disinfection of the baggage of all immigrants, is worthy of mention and commendation; that the action of the Grand Trunk Railroad of Canada in disinfecting all immigrants' baggage, carried by that railroad destined to settle in Michigan in accordance with the Rules of this Board, is especially worthy of mention and of hearty commendation; that the action of the Canadian Pacific Railway in disinfecting at Detroit, and also for a time at Sault Ste. Marie, all such baggage destined to settle in Michigan is also to be warmly commended, and it is regretted that such commendation cannot properly be extended to its branches in the Upper Peninsula of Michigan.

*Resolved*, That the quarantine officials on our Eastern seaboard are to be commended for their apparent success in keeping out persons sick with cholera, and that the United States authorities are to be commended for the inauguration of systems of disinfection of immigrants' baggage at the foreign ports of departure.

*Resolved*, That this board warmly endorses, as it has heretofore earnestly advocated, the plan for the disinfection of all baggage of all immigrants at all times, and for other diseases than cholera, as it was recently unanimously voted by the Sanitary Section of the Pan-American Medical Congress, at Washington.

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* This report by the Secretary is printed on subsequent pages of this Report.

*Resolved*, That, although sanitary measures have been and are increasing in efficiency, and the winter season is now approaching, yet cholera-infection centers are scattered throughout Europe, and there is still danger of that disease reaching this country, and many of the communicable diseases most dangerous in Michigan are constantly liable to be brought in by immigrants, therefore this Board expresses the hope that all will continue to act for the exclusion of disease, and for the restriction of any dangerous disease within our borders, several of these diseases being of vastly more consequence than cholera.

Prof. Fall again read his resolution, and on motion of Dr. Vaughan it was adopted as follows:—

*Resolved*, That the action of the Dominion of Canada in disinfecting the baggage of all immigrants from Europe coming into its territory, and the establisment of its admirable appliances for this purpose, as described by Dr. Montizambert, at the recent meeting of the American Public Health Association at Chicago, meets our most hearty aproval. We commend earnestly this action of Canada to the U. S Government and hope that similar disinfecting plants will be established by it at U. S. Atlantic ports, and that the baggage of all immigrants to this country be will disinfected. We ask that this be done not alone that we may be saved from threatened invasions of small-pox and cholera, but also that a vastly greater saving of lives may be effected from measles, diphtheria, scarlet fever, pneumonia, consumption and other diseases which are of much more serious concern to the people of this country than cholera or small-pox.

On motion of Dr. Vaughan, it was voted that a copy of this resolution be sent to the Secretary of Agriculture of the Dominion of Canada, Dr. Frederick Montizambert, Dr. Walter Wyman, and the Secretary of the U. S. Treasury Department.

Prof. Fall left at 9:05 A. M. in order to reach his train for Albion.

The Secretary presented and read a letter from N. J. Power, Gen. Passenger Agent of the Grand Trunk R. R. of Canada, relative to certificates of disinfection from Canadian authorities being accepted at the Michigan border.

On motion of Dr. Vaughan the following resolutions were passed:

*Resolved*, That we instruct our inspectors at the Michigan border to accept and allow to pass all baggage bearing evidence from a properly-authorized Dominion or Provincial official that it has been disinfected in accordance with the rules of this Board, unless there is reason to believe that such baggage has been infected since leaving the Canadian point of disinfection.

*Resolved*, That the foregoing resolution be added to the immigrant inspection rules of the Michigan State Board of Health to stand as "Exception 4."

Dr. Milner left at 9:15 A. M. in order to catch the train for Grand Rapids.

The Board was practically adjourned when Dr. Milner left, at 9:15 A. M., because it left the Board without a quorum.

### REGULAR MEETING AT LANSING JAN. 12, 1894.

The meeting should have been called together at 3:30 P. M., but as no quorum was present, the meeting was not called to order until 7:30 P. M. The members present were: Hon. Frank Wells, President, Lansing; Prof. Delos Fall, M. S., Albion; Mason W. Gray, M. D., Pontiac; and Henry B. Baker, Secretary. [Dr. Victor C. Vaughan, Ann Arbor, Dr. George H. Granger, Bay City, and Dr. Samuel G. Milner, had notified the Secretary that it was impossible for them to attend this meeting.]

The Secretary presented and read the minutes of the meeting, Oct. 27, 1893, and the minutes of the meeting were approved as read.

State Board of Health vouchers Nos. 2366 to 2387, inclusive, were allowed.

Prof. Fall, of Albion, Committee on Water Supply and Purification of Sewage-Contaminated water, made a preliminary report. Prof. Fall has undertaken an analysis of the uncontaminated spring waters throughout Michigan, in order to ascertain the normal amount of chlorine. Ten parts per million has been considered the maximum amount of chlorine which should be found in good spring water, but he thinks that the standard will have to be raised somewhat for Michigan as most of the samples that he has examined contain over ten parts of chlorine per million parts of water. Prof. Fall proposes to continue this analysis of spring water not contaminated by leachings from barns, stables, residences, etc.

He wants a half pint of such water in a perfectly clean bottle, with a new cork, with reliable statement of source and surrounding conditions. Prof. Fall's report on this subject will supply a demand by which to judge of the extent of sewage contamination of waters thereafter examined chemically.

On motion of Doctor Baker, the Board voted to aid Prof. Fall in his work by authorizing him to expend a sum not to exceed twenty-five dollars to be used in paying expressage on samples of water sent to Prof. Fall, to determine the amount of chlorine.

On suggestion of Doctor Baker, the members agreed that the Office of the State Board of Health should aid Prof. Fall all it could in the collection of samples.

The Secretary read a brief announcement of some twenty-five items of business which he wished to bring before the Board at this meeting.

On motion of Doctor Baker, the Board voted to authorize the Secretary to print an abstract of the proceedings of this meeting.

The Secretary presented the question whether or not the Board wished to reprint the pamphlet on the restriction and prevention of diphtheria. He mentioned that he had sent copies of this pamphlet to the members, that they might read it with a view to revision before printing. The members proceeded to suggest amendments; and. the pamphlet as amended, was ordered printed to the number of 15,000 copies.

Prof. Fall suggested that side heads be placed on the pages of the diphtheria pamphlet.

On motion of Doctor Baker the Board voted to authorize the Secretary to have printed not to exceed two thousand copies of the Proceedings of the Conference of State and local health authorities, at Ann Arbor, Michigan, June 15 and 16, 1893.

The Secretary presented an invitation from the leading citizens of Menominee, for the State Board of Health to hold a sanitary convention in that city. The Board voted to accept the invitation, and appointed Prof. Fall a committee from the State Board to visit Menominee, and make arrangement for the proposed convention.*

On motion the voucher for Prof. Fall's expenses to Menominee to make arrangements for a Sanitary Convention was allowed, subject to Prof. Fall's certificate.

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*This convention was held at Menominee and the Proceeding have been printed in pamphlet form.

The Secretary presented charges, made by a citizen of Sault Ste. Marie, against Dr. T. N. Rogers, Inspector of Immigrants and Travelers, at Sault Ste. Marie, Michigan.

On account of the prospective suspension of the Michigan quarantine, no action was taken by the Board.

President Wells proposed to suspend the quarantine on the Michigan border.

Dr. Gray requested the Committee on Quarantine to give its judgment on the advisability of doing away with the Inspection, and Mr. Wells spoke as follows:—

As far as I am concerned I am in favor of discontinuing quarantine on the border, because I do not believe it to be longer necessary, and because I believe the people of Michigan would not warrant the expenditure of so much money. The decision of the Judge of the 11th Judicial Circuit is adverse, and makes it difficult for the Board to carry out its Rules which were made under the State Law, and the penalty clause of this law has been decided to be unconstitutional. Doctor Wright's work at Detroit has been very light; although he has, of course, had to spend a great deal of his time in performing the Board's requirements. The immigration has been so light that he has had very little actual work to do, and as far as the need for inspection at Detroit, it is very little. The inspection at Sault Ste. Marie has not been satisfactory at any time, and Port Huron seems to be the only place where there is much of any need for an inspector. Considering the decision of Judge Steere, it is quite probable the railroads will all object to the detention and inspection, and will act as the roads at the Soo have acted. I would rather withdraw than be driven away.

Dr. Baker remarked that he would rather be driven away; then, if small-pox should come into Michigan, it would be no fault of the State Board of Health.

Prof. Fall suggested that, by the decision of Judge Steere, the Board would be compelled to withdraw its inspectors.

Doctor Baker: I believe that the Michigan inspection of immigrants has done much in preventing the introduction and spread of dangerous communicable diseases in Michigan. The stand the State Board has taken has been the means of raising the standard of quarantine in this country, tending as it has toward the disinfection of the baggage of all immigrants coming into this country. It is not improbable that the inspection at the border has been the means of keeping Michigan free from small-pox, and it is probable that it has lessened the introduction of other diseases. The Michigan inspection rules were carried out during the summer at Levis, near Quebec, and are now being carried out at Halifax, under the direction of Dr. Wickwire, Port Health Officer of Halifax. Small-pox is now quite prevalent is several States, but it is hoped that Michigan will not be visited by this disease. Owing to the depression in mining, lumbering and other business, immigration will probably be much lessened.

The recent judicial decision was discussed, and a resolution was adopted as follows:—

"*Resolved*, That in view of the adverse decision of the Hon. Joseph H. Steere, of the 11th Judicial Circuit, declaring the penalty portion of the Michigan Quarantine Law unconstitutional, the immigrant inspection at the Michigan border is hereby suspended from and after Jan. 13, 1894.

The members agreed that the cost of printing the Proceedings of the Ann Arbor Conference should be paid out of the Quarantine fund.

The Board authorized the Secretary to give Mr. Willitts for distribution by himself, two hundred copies of his paper on "Achievements of Sanitation."

The Secretary presented a letter which he had received from Supt. Clarke of the School for Deaf at Flint; and in accordance with Mr. Clarke's request, the Board voted to send Dr. Hauxhurst, of West Bay City, to the School for the Deaf at Flint, to investigate the outbreak of scarlet fever in that institution, at a compensation of ten dollars per day and expenses.

The Board also authorized the President and Secretary to employ some other expert to go to the School for the Deaf in the event that Dr. Hauxhurst could not be obtained.

Doctor Baker presented an invitation which he had received from the Wanye Co. Medical Society to read a paper on the "Prevention of Pulmonary Tuberculosis" or "Consumption as a Disease Dangerous to the Public Health." In view of the recent action of the State Board of Health, and the proposed coöperation of the Detroit Board of Health in the same direction, the State Board requested the Sceretary to accept the invitation, and offered to pay the Secretary's expenses.

On motion of Doctor Baker it was voted that Mr. Willitts' paper on "Achievements of Sanitation" be printed in the Annual Report of the State Board of Health. (Later, this action was reconsidered.)

The Board voted to print in the Annual Report Dr. Baker's paper on "Influenza," which was read before the Nashville meeting of the American Medical Association, in May, 1890.

The Secretary presented some letters which he had received from Mrs. Todd of Burr Oaks, an officer of the W. C. T. U., who asked that the State Board of Health take up the subject of "Alcohol as a Poison," and teach it to the people at sanitary conventions and in other ways. The Board took no formal action on the subject. Papers on the subject of alcohol, by several members of the Board, had previously been published.

The subject of a chair of sanitary science at the State Normal School, and at the State Agricultural College, was presented by Doctor Baker. He mentioned that the State Board of Agriculture had already been memorialized by the president and other members of this Board, including himself, to establish a chair of hygiene; but he thought the State Board of Health as a whole should continue to exert its influence. He argued that the State law compelled the common schools of Michigan to devote time to the teaching of hygiene, but that there was not much provision for the proper education of teachers who are compelled to teach hygiene. The State Normal School is devoted to the training and education of teachers, and the State Agricultural College has its vacation in the winter in order that its students may teach, yet neither of these institutions has a chair of hygiene or sanitary science. The State Board of Health has already put forth its efforts for work at the Michigan University, and a Laboratory of Hygiene has been established, and is now doing great good. Doctor Baker thought that the youngest pupil in our public schools should have an idea of how the most dangerous communicable diseases are spread, and that it would be just as practicable to teach them the restrictive measures, as it is to teach them all about the bones, muscles, and nerves, as is now attempted. Each pupil should also know just what disease causes most deaths in Michigan, and just how it may be prevented or avoided. But how are these pupils to be taught such subjects, when there is practically no adequate provision for the education of the teachers?

Prof. Fall said he was very glad to say that Albion College was teaching sanitary science. A large class of the best students in the college have this course of training, and exhibit much interest in the subject.

On motion of Prof. Fall, the Board voted that a committee of three be appointed by the President to memorialize the State Board of Education to establish a chair of Sanitary Science at the State Normal School. Prof. Fall of Albion, Doctor Baker and Dr. Milner were appointed to act on this Committee.

On motion of Doctor Baker it was voted that Doctor Gray act as chairman of a committee to memorialize the State Board of Agriculture to establish a Chair of Hygiene at the State Agricultural College. It was also voted that President Wells and Dr. Vaughan be the other members of this Committee.

[Further statements relative to the Board's effort for the establishment of a Chair of Sanitary Science at Agricultural College, are printed on subsequent pages of this Report.]

The Secretary presented a number of communications which he had received from Mr. J. B. Nagelvoort, Analyst with Parke, Davis and Co. of Detroit, relative to the regulation of the sale of poisons in Michigan. But on account of the late hour, the Board took no action on the subject. The members however thought such action should be taken sometime in the near future. Doctor Baker mentioned that the Massachusetts law regulating the investigation of sudden deaths was the best he knew of.

The Secretary presented a letter with a copy of a bill for a Bureau of Public Health, which he had received from U. S. Senator F. B. Stockbridge. The Secretary read the letter, and the Secretary was directed to write to Dr. Avery, and to procure copies of the bills before Congress providing for a National Health Service.

On motion of Dr. Gray the Board voted to authorize the President and Secretary to employ extra clerical help for six months in order to bring the work of the Office up nearer to date.

On motion the Board adjourned at 12:05 A. M.

### SPECIAL MEETING AT LANSING, MARCH 13, 1894.

In pursuance of a call by President Wells, the State Board of Health should have met in Lansing, March 13, 1894, at 1:30 P. M., for the purpose of the examination of plans and specifications of the proposed new Home for Feeble Minded, at Lapeer, and the transaction of such other business as might properly come before the Board. There was no quorum present; the only members present at 1:30 P. M. were Hon. Frank Wells, President, and Henry B. Baker, Secretary. Dr. Samuel G. Milner of Grand Rapids, came in about 3:30 P. M.

The Board of Building Commissioners for the Home for Feeble Minded, and the Board of Corrections and Charities were in joint session at the Governor's Office where the president and secretary of this Board joined them, thinking they would examine the plans and specifications and rely upon the State Board of Health to confirm their recommendations at some future meeting.

There were present at the joint meeting: Hon. John T. Rich, Governor and ex-officio member of the Board of Corrections and Charities, Rt. Rev. George D. Gillespie, Hon. James M. Neasmith, Doctor Samuel Bell, and Hon. L. C. Storrs, officers and members of the Board of Corrections and Charities; Hon. Cyrus G. Luce, and L. A. Sherman, members of the Board of Building Commissioners; and Hon. Frank Wells, Doctor Samuel G. Milner, and Doctor Henry B. Baker, members of the State Board of Health. Ex-Governor Luce presided over the meeting.

The plans were presented and explained by Secretary Sherman and Architect Hess, there were no written specifications. The members of the State Board of Health made a number of suggestions, some of which are as follows:—

The heating should be by the indirect method.

The ventilation should be by the natural method. A blower or other mechanical contrivance should not be relied upon for the fresh air, because, if by any accident or carelessness the machinery stops, the ventilation stops.

It is a good plan wherever practicable to have the foul-air outlet under the window, because the cold air falls down the window, and, unless taken out there, it sweeps across the feet of the occupants of the room. The foul-air can be then taken under the floor in a duct so lined as to be free from risk of fire, to the inside wall and thence up a ventilating shaft. The foul-air shaft should be in an inside wall, and it is better to take the foul and cold air under the floor than across the feet of the occupants. The foul-air outlet should be at the floor level, in order to economize heat, and to take out dust which may at any time contain the germs of disease. The ventilation of each room should be by a ventilating shaft, to the outer air, separate and distinct from that of any other room. Several ventilating shafts may be grouped in the attic, in order to avoid so many openings through the roof, but each must continue separately to the outer air.

Chairman Luce asked Secretary Baker if he thought the State Board of Health would approve the plans, if the Building Commission would have the plans re-drawn to conform with the suggestions made by the members of the State Board of Health there present?

Secretary Baker replied that he did not know, but thought the State Board of Health would approve of the indirect system of heating, of having the foul-air outlets at the floor level, and the ventilating shafts from each room separate and distinct to the outer air; and the Board has heretofore disapproved of the plan of relying upon a blower for ventilating purposes.

Although the foregoing suggestions or recommendations were made, no formal action was taken by the members of this State Board of Health. The members of the Board of Building Commissioners said they would have the plans re-drawn to conform to the suggestions made by the members of the State Board of Health, and would endeavor to submit the plans and specifications to the State Board of Health as soon as practicable, perhaps at the regular meeting of the State Board of Health March 13.

The members of the State Board of Health left the joint-meeting about 5:00 P. M., for the office of the Secretary, and no further official business was done.

HENRY B. BAKER,
*Secretary.*

[The report of the examination of the plans and specifications for the proposed Home for the Feeble Minded, is printed on page xvi of this Report.]

### SPECIAL MEETING AT MENOMINEE, APRIL 6, 1894.

The call for this meeting was as follows:—

STATE BOARD OF HEALTH, MICHIGAN,
OFFICE OF THE SECRETARY,
*Lansing, March 29, 1894.*

*Member of State Board of Health:*

DEAR SIR:—A special meeting of the State Board of Health is hereby called to meet in Menominee April 5 and 6, 1894, between the sessions of the Sanitary Convention, for the purpose of auditing bills and accounts, and for the transaction of such other business as may properly come before the Board at that meeting.

Very respectfully,
FRANK WELLS,
*President.*

This meeting occurred at the residence of Dr. H. L. Rosenberry, in Menominee, April 6, 1894, between the afternoon and the evening sessions of the Sanitary Convention.

The members present were:

Hon. Frank Wells, president.
Mason W. Gray, M. D.
Prof. Delos Fall.
Henry B. Baker.

State Board of Health vouchers numbers 2396 to 2402, inclusive, were allowed.

On motion of Dr. Baker, it was voted that the expenses of members of this Board in attending this meeting be allowed at the amounts certified to be correct by the several members incurring the expenses.

The Secretary presented a letter and resolution received by him from Dr. Milner, member of this Board, who could not be present. The resolution related to the dangers to the people of Michigan from the use of milk and meat from tuberculous animals, and authorized the Secretary of this Board to investigate and report to this Board the extent of the danger.

The resolution was discussed, and, on motion, it was referred to the Committee on "Animals' diseases dangerous to man,"—Mason W. Gray, M. D., with request for a report on it at the next meeting of the Board. The resolution was then handed to Dr. Gray.

The Secretary presented the subject of a proposed State hospital for consumptives. He stated that since the publication of the two hektographed pages which he had sent to each member of this Board and to newspapers and journals, the proposition had been favorably received, the President of this Board and Prof. Vaughan, who was obliged to leave Menominee before the other members of the Board had arrived, had both expressed themselves as favoring the proposition. But the Secretary wished for such a formal expression as would make it the Board's proposition. He moved the adoption of a resolution,—That the proposition for the establishment of a State Hospital for Consumptives is very cordially approved by the State Board of Health.

Prof. Fall suggested that this wording of the resolution did not sufficiently make it plain that the proposition was the Board's proposition.

On motion the resolution was referred to the Standing Committee on "Epidemic, Endemic and Communicable Diseases,"—Prof. Victor C. Vaughan, with request for a report on it at the next meeting of this Board.

On motion of Dr. Baker, it was voted that the President be authorized to appoint some or all of the medical members of this Board as delegates to the coming meeting of the State Medical Society at Lansing May 3 and 4, 1894. The Secretary stated that it being understood that the subject of the relation of the State to tuberculosis would be discussed, it was, in his opinion, desirable that as many members of this Board as would be eligible to membership in that Society should be present, and learn the views prevailing in the Society, and be prepared to take part in the discussion.

On motion of Dr. Baker, it was voted that Dr. Vaughan be appointed a delegate of this Board to attend the meeting of the "Association of American Physicians," especially that section of the Association constituting the "American Climatological Association," in Washington, D. C., May 29, 30 and 31, 1894.

The Secretary presented and read a statement, prepared by the late Dr. John H. Rauch, of the status of small-pox in the United States, March 17, 1894, as follows:—

### *Small-pox Situation in the United States, to March 17, 1894.*

In the issue of the Journal of the American Medical Association for March 31, 1894, there is an article on "The Small-pox Situation in the United States," by John H. Rauch, M. D., Ex-Secretary of the Illinois State Board of Health, from which the following paragraphs are quoted:—

"Ontario.—One case near Burgessville, Oxford county. Origin, Chicago.

"There are now in Massachusetts 21 cases; of these 17 are in Boston. Connecticut, 2; New York, 123, distributed as follows: New York City 43, Brooklyn 60, and 20 cases throughout the State. New Jersey 4 cases; Pennsylvania 29, 12 of these being in Philadelphia. Ohio 7 cases, Indiana 3, Illinois 168 cases; of these there are 15 in the State and 153 in Chicago. Wisconsin 10 cases, Michigan 4, Iowa 1, Virginia 1, Georgia 10, Vermont 1, and Tennessee 8 cases. Total in the United States 389 cases, and less than there were on March 1.

The Board then adjourned.

HENRY B. BAKER,
*Secretary.*

### REGULAR AND ANNUAL MEETING AT LANSING, APRIL 13, 1894.

The meeting was called for 3:30 P. M., but at that time only the President, Doctor Milner, and the Secretary, were present, who did not constitute a quorum. Later Prof. Fall and Doctor Vaughan arrived, and the Board was called to order at 6:15 by President Wells.

The Secretary presented and read the minutes of the Regular meeting at Lansing, Jan. 12, 1894. With a few corrections by the Secretary, the minutes were approved.

The minutes of the special meeting at Lansing, March 13, were read, and approved. Technically speaking these minutes were only a statement relative to three members of the Board meeting in joint session with the Board of Buildings Commissioners for the Home for the Feeble Minded, and the Board of Corrections and Charities. No quorum of the State Board of Health was present at that meeting, so no formal action was taken, but suggestions were made relative to the plans for the proposed new Home for the Feeble Minded.

The minutes of the special meeting at Menominee, April 5 and 6, were read and approved.

State Board of Health vouchers numbers 2391 to 2395 and 2403 to 2418, inclusive, were allowed.

The Secretary presented the quarterly financial statement of the Board's appropriation, and the statement was referred to the Committee on Finance—Hon. Frank Wells.

As this was the Annual Meeting and the time for the President's Address, the President made a brief address somewhat as follows:—

"During the last year the State Board of Health has done much good work, including that in connection with quarantine and the prevention of the introduction into Michigan of dangerous communicable diseases. The Board has entered upon a most important work—for the prevention and restriction of tuberculosis in man, and I believe that the results will be great. This Board has taken the lead of other State Boards of Health in declaring consumption to be dangerous to the public health, and has recommended advanced measures for its restriction. At this meeting committees are to report upon two other measures of restriction which it is believed will prove to be exceedingly important."

Under the head of brief announcements, the Secretary read a list of twenty items of business which he wished to bring before the Board, if there was opportunity.

It was suggested by Dr. Milner that there might be a desire at the next legislature to make some changes in laws relating directly or indirectly to public health in Michigan, and he thought it was important that the chairmen of committees should be requested to present, at the next meeting of this Board, any legislation which they thought should be proposed to the next legislature.

The foregoing suggestion was approved by Doctor Vaughan and other members.

In accordance with the foregoing suggestion by Dr. Milner, the Board requested the President to inform the Chairmen of the various committees.

Doctor Vaughan asked if the Office had plenty of the Public Health Laws so that he could have one hundred copies for distribution to his class in sanitary science.

The Secretary replied that there was a sufficient number, and that he would endeavor to supply Doctor Vaughan with the pamphlets.

Prof. Fall mentioned that he had been assisting to conduct a teachers institute at Albion, and had been requested to deliver several lectures on sanitary science. The lectures had been delivered, and much interest was shown, and he believed it was a good way to reach the public, by the education of the teachers in the State on sanitary subjects.

Doctor Milner said that a literary society in Grand Rapids, had taken considerable interest in sanitary subjects, and had requested him to supply some of the pamphlets of the Board, and he would like to have a number of copies of Doctor Baker's paper on Consumption, which was read before the Wayne Co. Medical Society, for distribution to the members of that society.

Dr. Baker said there were only a few copies of his paper, and he thought it would be impracticable to supply the Society, but that there were other papers which he had read lately which were similar, and would be published in the Proceedings of the Menominee Convention.

Mr. Wells said—I should like to have this year such a Conference of Health Officers, as we held in 1893. I think the Conference at Ann Arbor was a very valuable one, and productive of much good. Ann Arbor is the place to hold another Conference, because the health officers can get from the State Laboratory of Hygiene many points relative to the causation of disease, which will aid them in their public-health work.

Dr. Vaughan said he had had many health officers say to him that they enjoyed and received much benefit from the last Conference.

Mr. Wells—I think in advertising the proposed Conference that there should be an invitation planned which should urge upon local boards the importance of having a representative at the Conference.

On motion of Prof. Fall, it was voted that this Board should hold this year another Conference of health officers of Michigan, at Ann Arbor, sometime in June.

On motion of Prof. Fall, it was voted that a Committee of three, of which Dr. Vaughan shall be chairman, be appointed to make arrangements for the proposed Conference of health officers.* Prof. Fall and Dr. Milner were appointed by the chair to act as the other members of the Committee.

In order to place the subject of the restriction of tuberculosis in animals, before the board, Dr. Milner again mentioned the resolution which he had sent to the Secretary who presented it at the Menominee meeting, and which was referred to Dr. Gray, the Committee on "Animals' diseases dangerous to man." The purport of the resolution was to direct the Secretary to institute an investigation of the cattle and milk in different parts of the State, and report to what extent the health and lives of the people are endangered by tuberculous meat and milk. Dr. Milner said that since coming to Lansing he had changed his idea on the subject, and believed as some other members did that it was best to confer with the State Live Stock Commission on the subject.

On motion of Dr. Baker the Board voted that the President be requested to call a special meeting† of this Board, at such time as the State Live Stock Commission could meet with the Board, for the consideration of the subject of tuberculosis in animals and in man. It was suggested that the joint-meeting might be at Ann Arbor about the time of the proposed Conference of health officers.

Dr. Baker said he had conferred with the State Veterinarian, who advised further and personal conference by this Board with the Live Stock Commission. Dr. Baker read from the last (1892) annual report of the State Live Stock Commission, what there was treating on the subject of tuberculosis in animals. He said that he thought the recent action of the State Board of Health in declaring tuberculosis a disease dangerous to the public health, would open the way for the action of the Live Stock Commission, and he sincerely hoped the Commission would coöperate with this Board for the restriction of tuberculosis in animals and in man. He further said that the powers of the Live Stock Commission were great, and they had an unlimited amount of money for research, whereas the State Board of Health's appropriation was exceedingly limited.

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* The Conference of Michigan Health Officers was held, and the proceedings were printed in pamphlet form.

† The proceedings of this special meeting will be found on subsequent pages of this Annual Report.

Secretary Baker read a newspaper clipping relative to a herd of Jersey cattle belonging to the Pratt Institute of Brooklyn, being killed because tuberculin had proved the cattle to be infected with tuberculosis. The herd were valued at about $3,000.

In connection with the proposition for a State Hospital for Consumptives there was some discussion relative to its management. Dr. Milner thought that the hospital should not be managed or operated by any one school of medicine, because that would create opposition and jealousy in the profession.

Dr. Vaughan said the Hospital would be more especially for the isolation, than for the treatment, and he did not see why there should be any feeling.

Mr. Wells said he thought the Hospital should be at the State University in connection with the State Laboratory of Hygiene.

Dr. Vaughan said he thought it should be at the State University for three reasons:—(1) There would be no expense in buying ground for the building; (2) it could be heated and lighted from the central plant; and (3) it would be a source of instruction to the students and to the patients.

Mr. Wells—What I understand is that the Board shall put itself on record as favoring legislation on the subject.

On motion of Dr. Baker, the Board voted that the Secretary be authorized to print the usual number of abstracts of proceedings of this meeting.

The Secretary presented his quarterly report, and read some portions of it.

The Secretary presented and read the resignation of Mr. George E. Willitts as Acting Secretary; also the Secretary's letter of acceptance which had been written in the interval of the Meeting. On motion of Prof. Fall, the Board voted to formally accept the resignation.

On suggestion of Dr. Baker, it was voted that a committee of one be appointed to make arrangements for a Sanitary Convention, should an invitation from a desirable place be received before the next meeting of the Board. (The appointment was not then announced by the President.)

The subject of tuberculosis in man and its restriction, had been referred to Doctor Vaughan, a committee on "Epidemic, Endemic and Communicable Diseases," with request to report at this meeting. Dr. Vaughan said the time had been so short that he had not had time to give the subject much thought. He did, however, present a report which was incorporated in the following resolutions which were amended and adopted as follows:—

*Resolved*, That we recognize the following facts:—

(1) That tuberculosis is the most grave and fatal disease now affecting the health and lives of the people of this State, destroying about 3,000 lives per year;

(2) That this disease originates principally by transmission from man to man or from man to animals and again to man;

(3) That the spread of this disease can be best arrested by the disinfection of the sputa and other discharges, by special supervision of those infected, and by the care of such persons under conditions which will prevent the transmission of the disease to others;

(4) That such disinfection and supervision cannot be carried out in the crowded homes of the poorer classes; and

(5) That under conditions which will prevent re-infection, many consumptives may be permanently cured, and returned to their homes and work, educated in the methods of restricting the disease.

In view of these facts,—

*Resolved*, That this Board request of the next legislature an appropriation of $——— for the purpose of building, equipping, and maintaining a State Hospital for Consumptives.

On motion of Dr. Baker, it was voted that the Secretary be authorized to print in the Abstract of this meeting, as much of the proceedings of the Menominee meeting as he may deem advisable.

Prof. Fall then presented a preamble and resolution which were amended and adopted as follows:—

*Whereas*, It is desirable that every step taken shall tend toward giving the largest amount of sanitary education to the teachers and to the people of the State, therefore,

*Resolved*, That it is the judgment of this Board that the proposed State Hospital for consumptives should be located at the seat of the State University at Ann Arbor, in order that it may afford the best opportunities for the observation and study of this most important disease, in conjunction with the investigations now being so satisfactorily pursued, in bacteriology and other departments of sanitary science, at the State Laboratory of Hygiene.

Dr. Gray having arrived, and being the Committee on "Animals' Diseases dangerous to man" to whom was referred the subject of tuberculosis in animals, reported that he had conferred with veterinary surgeons in Pontiac and Detroit, had visited the health department in Detroit for conference with the Commissioner of health, that a few months ago he had corresponded with members of the State Live Stock Commission, from some of whom he had received replies. He read replies from two members. Hon. J. J. Woodman had written that the presence of tuberculosis in animals was not being reported to the State Live Stock Commission. Dr. Barringer had expressed the hope that this Board would investigate the subject thoroughly. Dr. Gray believed the State Live Stock Commission would coöperate in the restriction of tuberculosis, and believed the action of this Board in calling a meeting was a good plan.

The report was accepted.

Mr. Wells—I want to suggest that Dr. H. L. Rosenberry, formerly of Menominee, be requested to read a paper on the subject of local health work before the proposed Conference of Health Officers. I believe Dr. Rosenberry is one of the best health officers in Michigan, and the work he has done at Menominee is astonishing. I think any city could well afford to pay such a health officer a good salary.

The Secretary presented the question whether this Board would send a delegate to the meeting of the American Medical Association, at San Francisco, June 3–8, 1894? The Board took no action at this meeting. [No representative of the Board was present at that meeting.]

In accordance with action at the Menominee meeting, the President appointed Drs. Gray, Vaughan, Baker and Granger, as delegates* to the meeting of the State Medical Society, Lansing, May 3 and 4, 1894.

On motion it was voted that the President and Secretary act as delegates to the National Conference of State Boards of Health, providing there was a meeting of the Conference this year. [The meeting was held in Washington, Dec. 1894, but this Board was not represented. There was no money at the command of the Board to pay the expenses of a delegate.]

The Secretary presented a statement which he had prepared on the actions of the different State and Local boards of health in the United States in regard to the restriction of tuberculosis in man. He read the report and requested permission to print it in the Abstract of this meeting, which permission was granted. [This statement will be found on subsequent pages of this Report.]

In reply to a question asked by the Secretary, Doctor Vaughan said that he would examine or have examined at a small cost any sputa which was sent to him which was suspected to contain tubercle bacilli. The members thought this would help physicians in the diagnosis of the disease. The Secretary was directed to make such a statement in the printed Abstract of the proceedings of this meeting.

The application of Mr. D. E. Keyes of Grand Rapids, for a clerkship in the Office was presented, and the subject of additional help discussed, but no formal action was taken.

The Secretary presented, and read in part, a report on tyrotoxicon poisoning in Detroit, which he had received from Dr. Harvey, the Food Inspector. In reply to a question, Dr. Vaughan said that tyrotoxicon poisoning was probably due to an anaërobic germ.

The Secretary presented and read a letter which he had received from Dr. D. Milton Greene of Grand Rapids, relative to spectacle venders using atropine in the fitting of glasses, and the dangers therefrom. Doctor Greene wanted to know whether or not such was not practicing medicine. The members thought it was practicing medicine, and that such venders should comply with the State law relative to the registration of physicians.

On motion it was voted to request Doctor Vaughan to revise his paper on Cholera Infantum if necessary to make it accord with his present views, and that the Secretary be authorized to print an edition not to exceed 5,000 copies.

The Secretary presented a pamphlet which had been received from Prof. W. H. Sherzer of the State Normal School. The pamphlet contained rules for the care of the eyes, and recommended a greenish blue paper, which was the color of the paper used in printing the pamphlet. Doctor Baker said that he did not like the color of the paper, that it hurt his eyes, and asked the other members how it affected their eyes. Members of the Board thought it made them dizzy. Dr. Gray mentioned that Dr. Carrow of Ann Arbor had examined the eyes of the students at the State Normal School, and Dr. Carrow believed that the color of the paper was the future relief of poor eyes.

On motion the Board adjourned at 11:35 P. M.

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[*The delegates attended this meeting. Doctors Vaughan and Baker each read papers. The discussion which followed was of interest. The proceedings of this meeting have been printed in book form and can be found in the library of the State Board of Health Office.]

### SPECIAL MEETING AT LANSING, MAY 3, 1894.

The special meeting was called for the purpose of the examination of the plans and specifications of the proposed new building for the Home for the Feeble Minded, at Lapeer, etc.

The Board met at 11:30 A. M., May 3, 1894, between the sessions of the State Medical Society, and considered the plans and specifications. The following action was taken:—

It was voted that the plans for the two "cottages," one for the males and one for the females, be approved.

It was voted also that the plans for the dining hall be, in general, approved, with the following recommendations:—

Even considering that the present arrangements for the dining hall are temporary, the Board disapproves of the "*direct*" system of heating. This Board recommends that there be a fresh air supply at the rate of 2,000 cubic feet of air per hour for each occupant, and that the area of the foul-air outlets shall equal the area of the fresh-air inlets, and that the foul-air registers be placed at the floor level; that if practicable the foul-air ducts go up on the inside wall; and if on an outside wall, that they be supplied with heat at their bases.

(The vouchers for the expenses of the members in attending this special meeting, did not require action by the State Board of Health, but were to be allowed by the Board of State Auditors, the certificate of the member incurring the expense to be placed on each voucher.)

The Secretary presented the subject of the small-pox situation in the United States and especially in Michigan. The subject was discussed at some length, and the following preambles and resolutions were adopted:—

*Whereas*, small-pox is widespread in the United States, prevalent in Chicago, and now present in four places in Michigan, and

*Whereas*, by reason of the recent neglect of vaccination, it may be still more prevalent,

*Resolved*, that the State Board of Health recommends to each and every local board of health in Michigan, that it offer free vaccination with bovine virus under Act 146, laws of 1879; also that it recommends a general vaccination and re-vaccination of all persons,

*Resolved*, that the Secretary be directed to revise and reprint the two-page leaflet "Now is a good time to be vaccinated," to a sufficient number for distribution in Michigan.

It was suggested by the members that the heading of the leaflet "Now is a good time to be vaccinated" be changed to include a sub-head which should urge the necessity of vaccination and re-vaccination. Prof. Fall also suggested that the part of the leaflet which states that vaccination is a preventive of small-pox, should be made to state that point more strongly.

On motion the Board adjourned at 12:30 P. M., to 9:30 May 4, or at the call of the President, at any other hour, during the meeting of the State Medical Society.

### SPECIAL MEETING AT LANSING, MAY 17, 1894.

A special meeting of the Board was called for May 17, for the purpose of the examination of the plans and specifications for the Upper Peninsula Asylum for the Insane. A few days after the call was issued a letter from Hon. Claude W. Case, Chairman of the Board of Building Commissioners stated that the plans would not be ready until May 23. Accordingly the date for the special meeting was cancelled. However, the plans and specifications were examined at a special meeting of the Board, June 1, 1894.

### SPECIAL MEETING AT LANSING, JUNE 1, 1894.

A special meeting of the State Board of Health was called to meet in Lansing, June 1, at 10 A. M., to examine the plans for the proposed "Upper Peninsula Asylum for the Insane, at Newberry, Michigan. No quorum was present. Only the officers of the Board were present, and Hon. Frank Wells, President, and Henry B. Baker, M. D., Secretary, examined the plans, and made suggestions, relying upon the State Board of Health to confirm their recommendations.

[The Board confirmed their recommendations, at the meeting of the Board at Ann Arbor, June 14, 1894. The recommendations are printed on page xvii of this Report.]

### SPECIAL MEETING HELD AT ANN ARBOR, MICHIGAN, JUNE 15, 1894.

The Board met pursuant to a call from the President, made June 2, 1894.

The following-named members were present:—Hon. Frank Wells, President; Victor C. Vaughan, M. D.; Prof. Delos Fall, M. S.; Mason W. Gray, M. D.; George H. Granger, M. D.; Henry B. Baker, M. D., Secretary.

State Board of Health vouchers Nos. 2422-2443 and 2445, were audited and allowed. (A bill amounting to $20.00, of expenses incurred by the Secretary of the Board in attending the Conference of Representatives of State Boards of Health, at Chicago, Ill., as delegate from this Board, was audited and allowed; but as the said Conference was held to consider the situation in regard to the small-pox epidemic, the Secretary was directed to make a new voucher for this amount for approval by the Governor and payment from the general fund.)

On motion it was voted that the proceedings of the Second Annual Conference of Michigan Health Officers, now in session at Ann Arbor, be collected by the Secretary of this Board, and published as soon as possible.

The Secretary presented a report of the special meeting of this Board, which was called at Lansing, June 1, 1894, to examine plans for the Upper Peninsula Asylum for the Insane. The report contained a number of recommendations by the President and Secretary.

On motion the action of the officers of the Board at the special meeting, June 1894, was confirmed and the report thereof, by the Secretary approved.*

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[* The recommendations of the officers of the Board approved by the Board at this meeting, are printed on page xvii of this Annual Report.]

The Secretary presented the application of Mr. T. S. Ainge, of Detroit, for a position in the employ of this Board, and read portions of commendatory letters, accounts of his qualifications, and referred to others which he did not read. It was remarked by members of the Board, that the services of a person with such qualifications would be desirable; but that, for the present, there is greater need for the services of a physician who, if occasion demands, can visit a locality and make a diagnosis of diphtheria or small-pox.

The Secretary read a letter received from Dr. Geo. H. Cattermole, offering himself for employment in connection with this Board.

Dr. Baker moved, and it was voted, that the Secretary correspond with Dr. Cattermole, to see if his services can be obtained for work in the office of the Secretary of the Board, also with the view of having his services as a contagious-disease inspector.

A motion to hold the next Regular Meeting of the Board on the morning of the second Friday in July, was unanimously carried. (This is equivalent to an amendment of the by-laws. H. B. B., Sec.)

The meeting then adjourned.

Henry B. Baker,
*Secretary.*

## JOINT MEETING OF THE STATE BOARD OF HEALTH AND THE STATE LIVE STOCK COMMISSION, TO CONSIDER THE SUBJECT OF THE RESTRICTION OF TUBERCULOSIS IN ANIMALS AND IN MAN.

### *The Way it Came About.*

At a special meeting of the State Board of Health, held at Menominee, Michigan, April 6, 1894, the subject of Tuberculosis in animals as a cause of tubercular diseases in man, was presented for consideration of the Board by a resolution sent by Dr. Milner, to the effect, that "the Secretary of this Board institute an investigation of the cattle and milk in different parts of the State, and report in what way and to what extent the health and lives of the people are endangered by tuberculous meat and milk."

This resolution was referred to Dr. Mason W. Gray, the committee of the Board on "Animals' Diseases dangerous to man," with request that he report thereon at the next meeting of the Board.

At the Annual Meeting of the Board, held at the State Capitol April 13, 1894, Dr. Gray reported relative to this subject: that he had conferred with veterinary surgeons in Pontiac and Detroit, had visited the health department in Detroit for conference. had corresponded, in regard to this subject, with members of the State Live Stock Commission, and that correspondence with Hon. J. J. Woodman and Dr. Barringer, members of that commission had elicited a statement from the former, that the presence of tuberculosis in animals is not being reported to the State Live Stock Commission; and from the latter, that he hoped this Board would investigate the subject thoroughly.

Dr. Gray expressed the belief that the State Live Stock Board would coöperate freely with this Board in an investigation of tuberculosis in animals.

At the same meeting, Dr. Baker said he had conferred with the State Veterinarian, who advised further and personal conference by this Board with the State Live Stock Commission, relative to this subject; and Doctor Baker expressed the opinion that now, while vigorous action is being taken by the State Board of Health to restrict tuberculosis in man, is a favorable time for concerted action of the State Board of Health and the State Live Stock Commission in extending restrictive measures to outbreaks of this disease in domestic animals. With this object in view, "It was voted that the President be requested to call a special meeting of this State Board of Health at such time as arrangements can be made, for a joint meeting with the State Live Stock Commission, to consider the subject of the restriction of tuberculosis in animals and in man."

In accordance with the foregoing resolution, the President of this Board issued a call to the members, to convene in joint-meeting with the State Live Stock Commission, at Ann Arbor, during the "Second Annual Conference of Michigan Health Officers," June 14 and 15, 1894; and, at the same time, he addressed invitations to the President and members of the State Live Stock Commission and to the State Veterinarian, to attend that meeting. The result of this action was that a joint-meeting of the two State Boards was held at Ann Arbor June 15, 1894, the minutes of which are as follows: —

### PROCEEDINGS OF THE STATE BOARD OF HEALTH AND THE STATE LIVE STOCK COMMISSION, AT A JOINT MEETING HELD AT THE COOK HOTEL, ANN ARBOR, MICH., JUNE 15, 1894, TO CONSIDER THE SUBJECT OF THE RESTRICTION OF TUBERCULOSIS IN ANIMALS AND IN MAN.

The meeting was called to order at 7:30 A. M. There were present Hon. H. H. Hinds, President; Hon. J. J. Woodman and Dr. John E. Barringer, members, of the State Live Stock Sanitary Commission; Hon. Frank Wells, President; Prof. Delos Fall, member; and Dr. Henry B. Baker, Secretary, of the State Board of Health.

The Hon. Frank Wells was chosen Chairman and Dr. Baker Secretary of the meeting.

Hon. H. H. Hinds spoke of the pleasure it gave the State Live Stock Sanitary Commission to meet with the State Board of Health, and to coöperate with it in all measures for the restriction and prevention of tuberculosis.

Dr. Baker made a few remarks on the importance of the coöperation of these two State Boards for the restriction and prevention of this most important disease.

Hon. H. H. Hinds spoke of the laws of this State, and those of other States, on this subject. He thought our State laws excelled. He suggested that the subject be taken up in the form of original legislation. Let the present laws alone;—do not let them come before the legislature to be amended and possibly not improved. He thought the present Michigan law the best in the country. Under the present law the Texas cattle fever is well controlled. He thought the present law would be enough to wipe out tuberculosis.

Mr. Woodman spoke to the same effect as Hon. H. H. Hinds, except in that he stated that the present law gave the Commission no power to prevent the use of food products, from animals, which may be dangerous to man.

Dr. Baker asked if the Live Stock Commission has the power to inspect for tuberculosis, and to test animals by the use of tuberculin.

Dr. Barringer said no.

Mr. Hinds replied—the first answer is, no. The law gives the power if the animals are in a condition likely to spread the disease to *animals.*

Mr. Woodman said they had not the power to prevent the owners of diseased cows from milking them and selling the milk to be used by *man.*

Hon. H. H. Hinds read the law, to show that the Live Stock Commission deals with those diseases only, which are of a "malignant" character. Not horse distemper, although contagious; it is not "malignant."

Prof. Fall asked what the Live Stock Commission can do to give us knowledge as to the extent of danger to man? If we stamp out the disease in man, are we still in great danger from animals?

Hon. H. H. Hinds replied that the Commission could be relied upon to do all possible under the law. Recently, by request, animals in Battle Creek were inspected; but the Commission could not inspect all the animals throughout the State. If that is required, new legislation is needed.

Mr. Woodman said that, if local boards of health would look after this subject, and report promptly to the Live Stock Commission, much more could be done. The local health officers can do much to learn the existence of animals' diseases dangerous to man.

Prof. Fall asked if there was a way to ascertain the extent to which tuberculosis in man is derived from tuberculous disease of animals?

Dr. Baker suggested that there is a way to roughly approximate the extent, as follows:—We know that when the germs of tuberculosis enter the body by the air passages the disease first makes its appearance in the lungs or air passages, and that when the germs enter by the alimentary canal, the disease first appears in the bowels or the abdominal cavity or viscera. Then women do not very frequently have tubercular disease of the mammary glands; therefore it is fair to assume that a large proportion of the cases of tubercular disease in the bowels or abdominal cavity or viscera are due to the ingestion of the germs with the food, namely, with milk or meat. A large proportion of such cases in children are due to the milk, which is not usually boiled or in any way sterilized. Thus by adding up the totals of the deaths from such tubercular diseases as "Consumption of the bowels," "Tabes mesenterica," etc., some idea of the extent of the disease due to milk and meat can be gained.

Dr. Baker further suggested that it is important that if any general use of tuberculin is made, the tuberculin be sterilized, to the certain knowledge of officials in this State. In the early preparation of tuberculin, bacilli, or at least spores, were present. The immense interests involved make it incumbent on all officials who make tests of this sort, that the tuberculin shall be known to be free from infection.

Hon. H. H. Hinds said that at Battle Creek Dr. Kellogg, the Superintendent of the Sanitarium, which uses several barrels of milk each day, had said, "We will buy milk only that is from tested cows," so, although the owners were reluctant, they complied with his requirement; and the State Veterinarian made the tests. If there had been a "reaction" in any animal tested, the State Veterinarian would have reported the fact to the State Live Stock Commission. It turned out that there was no reaction, in any one of the nearly one hundred cows tested. [The inference is that every cow was free from tuberculosis.]

President Wells asked President Hinds if he would say to the health officers here in convention, that if they would report suspected cases to the Live Stock Commission, investigation would follow?

Mr. Hinds said—if a herd of milch cows contains an animal which is tuberculous, the herd may be tested, if some of the animals are in a condition to endanger animals.

The joint meeting then adjourned.

HENRY B. BAKER,
*Secretary.*

## QUARTERLY REPORTS OF WORK IN THE OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1894.

For each regular meeting of the State Board of Health the Secretary prepares a report of work in the Office during the preceding quarter. The abstracts of these might be published with the proceedings of the several meetings; but are collected and published here in order to bring the reports of work in the Office all together. In the report of work for the last quarter of 1893, pages l–li, is a summary relative to communicable diseases in the calendar year 1893. Following these quarterly reports will be found a general report for the fiscal year 1894.

### ABSTRACTS OF SECRETARY'S QUARTERLY REPORTS OF WORK IN THE OFFICE, DURING THE YEAR ENDING JUNE 30, 1894.

#### SECRETARY'S REPORT OF WORK IN THE OFFICE OF THE BOARD DURING QUARTER ENDING SEPT. 30, 1893.

*Communicable Diseases.*

The numbers of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and concerning which action was taken by this office, during the quarter, are as follows: for diphtheria, 142; for scarlet fever, 134; for typhoid and typho-malarial fever, 135; for measles, 37. Total for the five diseases, 448.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 1,768.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports, on cards, or in the form of the circular letter, were sent out during the quarter to the number of 1,643.

The "final" reports of outbreaks received and filed during the quarter, were: for diphtheria, 99; scarlet fever, 109; typhoid and typho-malarial fever, 37; measles, 50. Total for the five diseases, 295.

During the quarter, the local columns of newspapers to the number of 774, have been looked over for reports of occurrence of communicable diseases. This has resulted in giving this office information of the alleged occurrence of 16 outbreaks of diphtheria, 8 outbreaks of scarlet fever, 15 outbreaks of typhoid and typho-malarial fever, and 1 outbreak of measles. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table.

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, and Measles, from July 1 to Sept. 30, 1893, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the newspapers; the per cent of Newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer; and the per cent from which no reply was received from the health officer.*

| Diseases. | Reports from *all* sources, July 1–Sept. 30, 1893. | Per cent of all reports which were obtained from the newspapers. | Per cent of newspaper reports which were confirmed by the health officer. | Per cent of newspaper reports which were denied by the health officer. | Per cent of newspaper reports to which the health officer made no reply to notice sent from this office. |
|---|---|---|---|---|---|
| Diphtheria | 142 | 11 | 31 | 37 | 31 |
| Scarlet fever | 134 | 6 | 50 | 25 | 25 |
| Typhoid fever | 135 | 11 | 20 | 60 | 20 |
| Measles | 37 | 3 | 100 | 0 | 0 |
| Averages for the four diseases |  | 9 | 33 | 43 | 25 |

### *Compiling, Editing, Printing, etc., for Publication.*

A compilation of reports from health officers and clerks has been made, and the article relative to small-pox in Michigan in 1890 has been written for the Annual Report for 1891; work on the compilation of the reports, etc., for the articles on Diphtheria and Scarlet Fever in Michigan in 1891, have been commenced. The article on Scarlet Fever in Michigan in 1890 has been written and proved. The articles on Typhoid Fever, and on Nuisances in Michigan in 1890 have been completed for the printer. The article on Small-pox in Michigan in 1890 has been proved, and work on the proving of the article on Measles in Michigan in 1890 has been commenced.

Work in connection with the printing of the Annual Report for 1891 has been continued. Copy has been prepared for the printer, and the Proceedings of the Stanton Sanitary Convention has been printed in pamphlet form.

The article "Health in Michigan" for the new edition of "Michigan and Its Resources," which has been published by the Secretary of State, has been revised, and additions were made.

A pamphlet, "Names and Addresses of Health Officers in Michigan for the year 1893–4," has been prepared from the official returns, printed, and distributed.

### *Distribution of Publications, etc.*

A copy of the pamphlet "Names and Addresses of Health Officers in Michigan for the year 1893–4," has been sent to each of 1,260 health officers whose name and address has been returned to this Office. A copy of the pamphlet has been marked and sent to each delinquent locality.

Copies of the Eighteenth Annual Report of this Board, to the number of 1,800, have been sent to: Presidents and clerks of villages, and Sanitarians in this and other States.

About the usual number of pamphlets, on the Restriction and Prevention of each of the Dangerous Communicable Diseases, has been distributed to localities where dangerous diseases exist.

### *Work on Meteorology.*

The regular tri-daily meteorological observations have been continued at this Station, and a summary for each week and month, during the quarter, has been sent to the Director of the Michigan Weather Service and Local Forecast Official at Detroit for his use, and it is then sent by this Official at Detroit to the Chief of the U. S. Weather Bureau at Washington.

A supply of ozone test-paper for the months of Oct., Nov. and Dec. was sent, on Sept. 15, to each of fifteen meteorological observers.

Diagrams for the Annual Report were made as follows: Nos. ii., iii., iv., vi., vii., viii., ix., and xi., illustrating some of the principal meteorological conditions in Michigan for the year 1891. A diagram of "Impure source of water used by a person who contracted typhoid fever in Hartford, Michigan," and a diagram "Deaths from Cholera in London per 100,000 persons living" were made. This last is to illustrate a paper read by Mr. Willitts, at the Hillsdale Sanitary Convention.

The meteorolgical tables for the year 1892 have been made, and meteorological registers for Stations in Michigan from June to August, 1893,-inclusive, have been examined, and compilations on these registers have been made, with the exception of columns relating to humidity and atmospheric pressure.

### *Accessions to the Library, etc.*

During the quarter 132 books and pamphlets, and 256 numbers of journals (weeklies, monthlies, and semi-monthlies) have been received and entered in the library of this Board. The work on the card catalog has been continued.

### *Correspondence, Hektograph Work, etc.*

During the quarter 1,676 pages of letter-book have been used in copying the correspondence of the Office, not including the many postal cards and circulars which have been sent out but not copied.

More than the usual amount of hektograph work has been done, due to the great number of lists of immigrants destined to settle in Michigan which have been received from the ports of debarkation, and from the immigrant inspectors on the Michigan border. About 1,747 pages of hektograph work have been made, of which some 190 pages were relative to the opinion of the U. S. Judges in the case of Minn., St. Paul and Sault Ste. Marie R. R. vs. State Board of Health. Copies of the opinion were sent to the Press and to persons interested in the subject.

### *Work in Connection with Sickness Statistics.*

During the third quarter of 1893, 1,755 blank postal report cards, 125 record-books, 35 printed circulars and 72 hektographed circular letters regarding weekly card reports, have been mailed, in packages, to 122 health offices and regular correspondents; 1,434 weekly card-reports have been received and entered on the register; 52 copies of the hekotgraphed weekly bulletin "Health in Michigan" were mailed each week, and 101 copies of the monthly bulletin "Health in Michigan" have been hektographed and mailed each month. These bulletins have been consolidated for this quarterly report. Work has also been done on the compilation of the weekly card reports of sickness during the year 1891, for the annual report of 1892.

### *Health in Michigan in the Third Quarter of 1893. Communicable Diseases.*

Compared with the preceding quarter (April, May and June), reports from all sources show *diphtheria* to have decreased by an average of *one* place, *scarlet fever* to have decreased by an average of *eighteen* places, *typhoid fever* to have increased by an average of *thirty-five* places and *measles* to have decreased by an average of *thirty-five* places.

### *Meteorology and Sickness from All Causes, Third Quarter of 1883, Compared with the Preceding Quarter.*

A comparison of meteorological conditions of the third quarter of 1893, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been the same (south-west), the average velocity 26 per cent less, the temperature 10.83 degrees higher, the rain-fall at Lansing 4.17 inches less, the absolute humidity considerably more, the relative humidity slightly less, the day and the night ozone much less, and the height of ground above the water in the well at Lansing to have been 2 inches less.

Compared with the preceding quarter (April May and June), the reports from regular observers show a marked increase of diarrhea and inflammation of bowels, and a marked decrease of influenza, bronchitis and inflammation of kidney in the third quarter of 1893.

### *The Weather, and the Health in Michigan in the Third Quarter of 1893, Compared with the Average for the Seven Years, 1886–1892.*

A comparison of the meteorological conditions of the third quarter of 1893, with the average for the third quarters in the seven years 1886-1892, shows that in 1893, the prevailing direction of the wind was the same (south-west), the velocity was slightly greater, the temperature was nearly the same, the rainfall at Lansing was 1.25 inches less, the absolute, and the relative humidity were slightly less, the day, and the night ozone were considerably less, and the height of ground above the water in the well at Lansing was five inches less.

Compared with the average in the corresponding quarters in the seven years 1886-1892, the reports received from regular observers indicate that erysipelas, intermittent fever, remittent fever and consumption were less than usually prevalent, and that no disease was more than usually prevalent in the third quarter of 1893.

## SECRETARY'S REPORT OF WORK DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH, DURING THE QUARTER ENDING WITH DECEMBER, 1893.

### *Communicable Diseases.*

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and concerning which action was taken by this office during the quarter, are as follows: for diphtheria, 115; for scarlet fever, 147; for typhoid and typho-malarial fever, 139; for measles, 18. Total for the four (or five) diseases, 419.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 1,913.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports, on cards, or in the form of the circular letter, were sent out during the quarter to the number of 1,583.

The "final" reports of outbreaks received and filed during the quarter, were: for diphtheria, 84; scarlet fever, 106; typhoid and typho-malarial fever, 120; measles, 11. Total for the five diseases, 321.

During the quarter, the local columns of newspapers to the number of 927, have been looked over for reports of occurrence of communicable diseases. This has resulted in giving this office information of the alleged occurrence of 10 outbreaks of diphtheria, 11 outbreaks of scarlet fever, 31 outbreaks of typhoid and typho-malarial fever, and no outbreaks of measles. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE 1.—*Showing the number of outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, and Measles, from Oct. 1 to Dec. 31, 1893, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer; and the per cent from which no reply was received from the health officer.*

| Diseases. | Reports from *all* sources. Oct. 1–Dec. 31, 1893. | Per cent of all reports which were obtained from the newspapers. | Per cent of newspaper reports which were confirmed by the health officer. | Per cent of newspaper reports which were denied by the health officer. | Per cent of newspaper reports to which the health officer made no reply to notice sent from this office. |
|---|---|---|---|---|---|
| Diphtheria | 115 | 9 | 30 | 50 | 20 |
| Scarlet fever | 147 | 7 | 45 | 18 | 36 |
| Typhoid fever | 139 | 22 | 29 | 42 | 29 |
| Measles | 18 | 0 | 0 | 0 | 0 |
| Averages for the four diseases |  | 12 | 33 | 38 | 29 |

## *Summary Relative to the Calendar Year 1893.*

During the *year* 1893, this office took action upon 1,881 outbreaks of dangerous communicable diseases, which number includes 540 outbreaks of diphtheria, 674 outbreaks of scarlet fever, 394 outbreaks of typhoid and typho-malarial fever, 271 outbreaks of measles, and 2 outbreaks of small-pox.

Relative to dangerous communicable diseases, letters, written cards, etc., were sent out during the year to the number of 6,705. The number of communications relative to such diseases, which were received and placed on file during the year was 7,365.

A record is kept of facts concerning every outbreak of a "disease dangerous to the public health" upon which action is taken by this office, and also of every communication relating thereto received or sent out; this required over 14,000 entries to be made in the "Record Books," one of which books is kept for each dangerous communicable disease.

During the year the local columns of newspapers to the number of 3,441 have been looked over for reports of the occurrence of dangerous communicable diseases. This has resulted in giving this office information of the alleged occurrence of 61 outbreaks of diphtheria, 62 outbreaks of scarlet fever, 71 outbreaks of typhoid and typho-malarial fever, and 27 outbreaks of measles. To what extent the reports of these alleged outbreaks of the five diseases were verified during the year, is shown in the accompanying table:

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever and Measles, from Jan. 1 to Dec. 31, 1893, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer, and the per cent from which no reply was received from the health officer.*

| Diseases. | Reports from *all* sources, Jan. 1 to Dec. 31, 1893. | Per cent of all reports which were obtained from the newspapers. | Per cent of newspaper reports which which were confirmed by the health officer. | Per cent of newspaper reports which were denied by the health officer. | Per cent of newspaper reports to which the health officer made no reply to notice sent from this office. |
|---|---|---|---|---|---|
| Diphtheria....... | *540 | 11 | 28 | 38 | 39 |
| Scarlet fever. ... | *674 | 9 | 45 | 19 | 35 |
| Typhoid fever ... | *394 | 18 | 30 | 41 | 30 |
| Measles .......... | *271 | 10 | 22 | 8 | 70 |
| Averages for the four diseases... | ............... | 12 | 33 | 30 | 38 |

* The numbers of outbreaks given in this table do not necessarily agree with the numbers given in tables in another part of the volume including the Annual Report, for the reason that all alleged outbreaks, of which information was obtained from the newspapers are included in this table. If the health officers denied that such outbreaks occurred, or if they make no response to the letters sent from this office, such alleged outbreaks are not included in the compilation of that disease.

During the year 1893, compared with the year 1892, action was taken on outbreaks of dangerous communicable diseases as follows: On diphtheria, 44 outbreaks more; scarlet fever 18 outbreaks more on typhoid; and typho-malarial fever, 10 outbreaks more; measles 136 outbreaks more, and small-pox, the same number as in 1892. In all 208 outbreaks more were acted upon in 1893 than in 1892.

(The number of outbreaks acted upon in 1893 was almost the same as in 1891. The number in 1891 was 1,879, in 1893 it was 1,881.)

[Here followed accounts of small-pox, rabies, and alleged cholera in Michigan in 1893, which are ommitted here because the full accounts are published in Part II. of this volume.]

No Small-pox has occurred in Michigan during the last quarter of 1893.

### *Small-pox Now or Recently in other States and Provinces.*

In accordance with action of the National Conference of State and Provincial Boards of Health at Toronto, 1886, and Washington, 1887, "Inter-State Notifications of Dangerous Communicable Diseases" have been received, and the following facts learned relative to small-pox in other States and Provinces:—

| State. | Date of last notice. | Cases. | Deaths. |
|---|---|---|---|
| Ohio | October 24, 1893 | 5 cases. | |
| Minnesota | November 6, " | 1 case. | |
| Tennessee | " 9, " | 1 case. | |
| West Virginia | " 15, " | 1 case. | |
| Illinois | " 25, " | | |
| Indiana | December 12, " | 153 cases | 21 deaths. |
| Maine | " 13, " | 1 case. | |
| Louisiana | " 30, " | 1 case. | |
| Connecticut | January 4, 1894 | 6 cases. | |
| Massachusetts | " 9, " | 47 cases | 4 deaths. |
| Pennsylvania | " 11, " | *710 cases | *18 deaths. |
| Province of Ontario | " 11, " | 5 cases. | |

*These cases and deaths are in the city of Reading, Berks Co. Cases are also reported in Berks Co. at Friztown, West Leesport and Gibraltar, and at Friedensburg, Schuylkill Co. At Mechanicsburg, Cumberland Co —ten cases and one death. One case at Carlisle, Cumberland Co. and two at Willow Grove, Allegheny Co.

### *Compiling, Editing, Proof-reading, Printing, etc., last quarter, 1893.*

A compilation of the reports from health officers and clerks has been made, the compilation proved, and the article relative to Scarlet Fever in Michigan in 1891 has been commenced; the compilation of reports from health officers and clerks relating to Typhoid Fever in Michigan in 1891 has been commenced; the work in connection with proving and writing the article relative to Measles in Michigan in 1890 has been completed; the compilation relative to Diphtheria in Michigan in 1891 has been made and about half proved.

Articles relative to Typhoid Fever, Whooping-cough, Consumption, Glanders, Hydrophobia, Anthrax, Lump-jaw, Tyrotoxicon, Injuries, Loss of Life and Property in Michigan from the use of Kerosene, Gasoline and Naphtha, and Alleged Nuisances in Michigan, for the Annual Report of the State Board of Health for the year 1891, have been written, proof has been read in this Office, and the articles have been printed.

Proof has been read on the Proceedings of the Sanitary Conventions held under the auspices of this Board at Stanton and at Hillsdale.

The printing of the Annual Report of the Secretary of the State Board of Health for the fiscal year ending June 30, 1891, has been nearly completed. The indexing of this Report is nearly completed.

A statement of the Cases and Deaths from Diphtheria, Scarlet Fever, Typhoid Fever, Measles, and Whooping-cough, in Michigan in 1892, has been made from the annual report blanks from health officers and clerks of townships, cities and villages in Michigan.

### *Distribution of Publications, etc.*

The Proceedings of the Sanitary Convention held at Stanton has been sent to the Officers and participants of the Convention, members and ex-members of this Board, Secretaries of State Boards of Health and of State Medical Societies of other States, Sanitarians of this and other States, and other persons interested in sanitary work, to the number of about 1,100 copies. At the same time the resolution of this Board relative to consumption being a "Disease dangerous to the Public Health," was also sent to the foregoing-named persons, and has been widely distributed elsewhere to the number of about three thousand copies.

During the quarter 1,571 envelopes were directed to health officers of townshps, cities and villages, and about the same number (1,570) of envelopes were directed to clerks of townships, cities and villages. These envelopes are to be used in sending to each clerk and health officer in Michigan blank forms for making annual reports of "Diseases dangerous to the Public Health" during the year 1893. Each health officer and each clerk also receives, with each set of blanks, a circular letter giving instructions for making out the annual reports,. etc. Although the blanks were printed, the envelopes addressed and filled with the annual report blanks and letter of instruction, there was time only to send the supplies to 363 health officers and 362 clerks of cities and villages. The supplies to health officers and clerks of townships will be sent immediately after Jan. 1, 1894.

About the usual number of pamphlets relating to the restriction and prevention of the different dangerous communicable diseases, were distributed to health officers of localities where dangerous diseases were reported. It was requested at the same time that these pamphlets be distributed to the neighbors of the persons sick with such dangerous diseases.

### *Correspondence, Hektograph Work, etc.*

During the quarter, 1,061 pages of letter-book have been used in copying the correspondence of the Office, not including many postal cards and circulars which were sent out but not copied in the letter-book.

About 1,728 pages of hektograph work have been made, of which 150 pages were relative to the special meeting of the Board Oct. 27 and 28

1893, 270 pages were relative to the Dangerous Location of Consumptives, as reported to this Office by Dr. Myron Briggs, health officer of Speaker Tp., Sanilac Co., and 200 pages were relative to the opinion of Judge Steere in the case of Hurst vs. Warner. The hektograph work is slightly less than the preceding quarter, owing to the change in the manner of sending out immigrant notices, which are now mostly sent on blank forms for that purpose.

### *Work on Meteorology.*

The regular tri-daily meteorological observations have been continued at this Station, and a summary for each week and month during the quarter has been made for use in this Office in connection with sickness reports. The monthly summary has been sent at the end of each month, to the Director of the Michigan Weather Service and Local Forecast Official at Detroit for his use, and is then sent by him to the Chief of the U. S. Weather Bureau at Washington, D. C.

On Dec. 16, 1893, meteorological blank registers, envelopes, postal cards, ozone-test paper, etc., were sent to meteorological observers for the State Board of Health, for their use during the year 1894.

Diagrams for the Annual Report for the year 1892, were made as follows:—Nos. xvi., x., v., xii., xiv., xv., illustrating some of the principal meteorological conditions in Michigan for the year 1891; Nos. 1, 2, 3, 4 and 5 to be used in the article "Time of Greatest Prevalence of Each Disease in Mich. in 1891"; and a Diagrammatic "Map showing location and order of occurrence of Sanitary Conventions held in Michigan. This last-named diagram or Map accompanies Prof. Fall's paper on "Sanitary Conventions in Michigan," which was read before the National Conference of State and Provincial Boards of Health, at Lansing, June 6, 1892. A diagram showing the "Reported Deaths from Measles in Michigan during each year 1868 91" was also made and has been printed in connection with the article relative to measles in the Annual Report for 1891.

### *Accessions to the Library, etc.*

During the quarter, 84 books and pamphlets and 309 numbers of journals (weeklies, monthlies and quarterlies) have been received and entered in the library of this Board. The work on the card catalog of this Office has been continued.

### *Work in Connection with Sickness Statistics.*

During the fourth quarter of 1893, 1,725 blank postal report cards, 126 record books and 34 hektographed circular letters regarding weekly card-reports, have been mailed, in packages, to 119 health officers and regular correspondents; 1,474 weekly card-reports have been received and entered on the register; 53 copies of the hektographed weekly bulletin "Health in Michigan" were mailed each week, and 110 copies of the monthly bulletin "Health in Michigan" have been hektographed and mailed each month. These bulletins have been consolidated for this quarterly report. Work has also been done on the compilation of the weekly card reports of sickness during the year 1892, for the annual report for 1893.

### *Health in Michigan in the Fourth Quarter of 1893. Communicable Diseases.*

Compared with the preceding quarter (July, August and September), reports from all sources show *diphtheria* to have decreased by an average of *six* places, *scarlet fever* to have increased by an average of *fourteen* places, *typhoid fever* to have increased by an average of *nineteen* places and *measles* to have decreased by an average of *fifteen* places.

### *Meteorology and Sickness from All Causes, Fourth Quarter of 1893, Compared with the Preceding Quarter.*

A comparison of meteorological conditions of the fourth quarter of 1893, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been the same (south-west), the average velocity 42 per cent greater, the temperature 28.92 degrees lower, the rain-fall at Lansing 2.47 inches more, the absolute humidity much less, the relative humidity much more, the day ozone slightly more, the night ozone considerably more and the depth of water in the well at Lansing to have been 7 inches less.

Compared with the preceding quarter (July, August and September), the reports from regular observers show a marked increase of influenza, bronchitis and tonsillitis, and a marked decrease of dysentery, diarrhea and inflammation of the bowels in the fourth quarter of 1893.

### *The Weather and the Health in Michigan, in the Fourth Quarter of 1893, Compared with the Average for the Seven Years 1886–1892.*

A comparison of the meteorological conditions of the fourth quarter of 1893, with the average for the fourth quarters in the seven years, 1886 1892, shows that in 1893, the prevailing direction of the wind was the same (south-west), the velocity was slighty greater, the temperature was nearly the same, the rain-fall at Lansing was 1.67 inches more, the absolute and the relative humidity were more, the day ozone was less, the night ozone was more and the depth of water in the well at Lansing was 4 inches more.

Compared with the average in the corresponding quarters in the seven years, 1886-1892, the reports from regular observers indicate that influenza was more than usually prevalent, and that intermittent fever, remittent fever, erysipelas and inflammation of kidney were less than usually prevalent in the fourth quarter of 1893.

Respectfully submitted,

HENRY B. BAKER,
*Secretary.*

## SECRETARY'S REPORT OF WORK DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH DURING THE QUARTER ENDING WITH MARCH, 1894.

### *Communicable Diseases.*

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and concerning which action was taken by this office during the quarter, are as follows: for diphtheria, 110; for scarlet fever, 184; for typhoid and typho-malarial fever, 55; for measles, 57; for small-pox, 6. Total for the six diseases, 412.

The number of communications relative to dangerous communicable diseases, received and placed on file during the quarter, was 1,820.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports, on cards, or in the form of the circular letter, were sent out during the quarter to the number of 1,662.

The "final" reports of outbreaks received and filed during the quarter, were: for diphtheria, 81; scarlet fever, 134; typhoid and typho-malarial fever, 52; measles, 18; small-pox, 3. Total for the six diseases, 288.

During the quarter, the local columns of newspapers to the number of 1,018, have been looked over for reports of occurrence of communicable diseases. This has resulted in gving this office information of the alleged occurrence of 4 outbreaks of diphtheria, 11 outbreaks of scarlet fever, 3 outbreaks of typhoid and typho-malarial fever, and 2 outbreaks of measles. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table:

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever, and Measles from Jan. 1 to March 31, 1894, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

| Diseases. | Reports from *all* sources, Jan. 1 to Mar. 31, 1894. | Per cent of all reports which were obtained from the newspapers. | Per cent of newspaper reports which were confirmed by the health officer. | Per cent of newspaper reports which were denied by the health officer. | Per cent of newspaper reports to which the health officer made no reply to notice sent from this office. |
|---|---|---|---|---|---|
| Diphtheria | 110 | 4 | 25 | 25 | 50 |
| Scarlet fever | 184 | 6 | 55 | 0 | 45 |
| Typhoid fever | 55 | 5 | 33 | 33 | 33 |
| Measles | 43 | 4 | 0 | 0 | 100 |
| Averages for the four diseases | ............ | 5 | 40 | 10 | 50 |

### *Small-pox in Michigan, First Quarter of 1894.*

There had been no small-pox in Michigan since January, 1893 (when there was an outbreak at Springport, Jackson Co., and Pittsfield Tp., Washtenaw Co.) until the disease appeared during the first part of this quarter. Small-pox has been reported: At Otsego township and Otsego village, Allegan Co.; the village of Crystal Falls, Iron Co.; and in the cities of Menominee, Ishpeming and Kalamazoo. The total number of cases reported from the six localities was 16; the number of deaths was 4.

[Detailed statements of the outbreaks were here given; they will appear in the article on "Small-pox in Michigan in 1894," in Part II. of the Annual Report for 1895.]

From the foregoing it may be seen that small-pox was present at the close of the quarter in three different localities in the State, and probably four, but it is fair to assume that the outbreak at Crystal Falls is over.

### *Consumption in Michigan During First Quarter of 1894.*

During the quarter, Consumption was reported present in 185 localities in the State. A record is kept of the names of the localities, the date of the receipt of the information that the disease was present in the locality, and when correspondence was opened with the health officers of the jurisdictions in which the cases are. Over eighteen hundred copies of the four-page leaflet on the restriction and prevention of consumption were sent to the different localities for distribution where they would be most likely to do good.

### *Compiling, Editing, Proof-reading, Printing, etc.*

A compilation of reports from health officers and clerks has been made, the compilation proved, and the article relative to Measles in Michigan in 1891 has been commenced; the compilation of the reports relating to typhoid fever in Michigan in 1891 has been completed; the compilation relating to Diphtheria in Michigan in 1891 has been completed, and the work of writing the article has been commenced; and the compilation relating to Scarlet Fever in Michigan in 1891 has been made and the article is practically ready for the printer. Some new and useful tables have been incorporated in the articles relative to Scarlet Fever and Diphtheria, especially those showing the death-rates per 10,000 inhabitants in each county, and in each tier of counties in Michigan.

The index for the Annual Report for 1891 has been completed, and the Report is now being bound, and it is hoped to have copies for distribution soon.

Proof on the "first part" of the Annual Report of the Secretary for the fiscal year ending June 30, 1891, and on the index for the 1891 Report, has been read, and that for 1892 is ready for the printer. The printing on the Annual Report of the Secretary for 1892 has been commenced, and proof has been read on the articles "Meteorological Conditions in Michigan in 1891" and "The Time of Greatest Prevalence of Each Disease in Michigan in 1891."

Work has been begun on the articles relative to Meteorology, and Sickness Statistics, and on the "first part" of the Annual Report for 1893.

### *Hektograph Work, Correspondence, etc.*

During the quarter 2,400 pages of hektograph work have been made. There was considerable work in connection with the brief abstract of the January meeting, and on other subjects.

There were 1,106 pages of letter-book used in copying the correspondence of the Office, not including many postal cards which have been sent out but not copied in the letter-book.

### *Distribution of Publications, etc.*

About 1,100 copies of the Abstract of the Sept. 29 and 30, 1893, meeting, and about 1,200 copies of the Abstract of Proceedings of the Jan. 12, 1894, meeting of this Board, have been sent to: Members and ex-members of this Board, sanitary journal exchanges, meteorological observers and meteorological exchanges, members of State Boards of Corrections and Charities, secretaries of State Boards of Health, secretaries of State Medical Societies, libraries, newspapers, and health officers in other States.

About 1,500 copies of the printed proceedings of the Hillsdale Sanitary Convention were distributed to: Officers and participants of the Convention, members and ex-members of this Board, secretaries of State Boards of Health and of State Medical Societies, sanitary journal exchanges, members of State Boards of Corrections and Charities, secretaries of previous sanitary conventions, libraries, newspapers, and health officers in other States.

That portion of the printed abstract of the Jan. 1894 meeting of this Board, which referred to establishment of chairs of sanitary science, was marked, and, together with the Hillsdale Sanitary Conventions proceedings and the paragraph quoted from the title page of the annual report of the Australian Health Society, was sent to members of faculties of all colleges in Michigan, members of the State Board of Agriculture, principals of high schools and superintendents of graded schools in Michigan.

About the usual numbers of pamphlets on the restriction and prevention of the different dangerous communicable diseases were sent to the health officers of localities from which dangerous diseases had been reported. It was at the same time requested of these health officers that the pamphlets be distributed to the neighbors of the person sick with such disease, and to such other places as they would be likely to do good.

By special request of sanitarians in this and other States, copies of Annual Reports, proceedings of meetings and sanitary conventions, and pamphlets on the restriction and prevention of the dangerous diseases, have been sent where it was practicable and thought likely to benefit public health interests.

### *Return of the Name and Postoffice Addresses of Health Officers for the Year 1894-95.*

Envelopes to the number of 1,930 have been addressed to supervisors of townships, presidents and clerks of villages, and mayors and clerks of cities in Michigan. These envelopes were used for sending to these officials a circular letter of instructions, together with a form and addressed envelope for the return of the name and post-office address of the newly-appointed health officer, to the Secretary of the State Board of Health, in accordance with the State law.

### *Annual Reports from Health Officers and Clerks, for 1893.*

Annual Reports for the year 1893 have been received from 1,123 health officers and from 1,053 clerks of townships, cities and villages in Michigan. These reports convey to this office information relative to the prevalence of each dangerous communicable disease, and the condition of health, and of health work in each jurisdiction. Also reports stating the name, postoffice address, year of graduation, and the school of medicine to which each medical practitioner in the township, city or village belongs.

On February 21, a "Second request for annual report" was sent to 102 health officers, clerks and mayors of cities and to 345 health officers, clerks and presidents of villages from whom no report had yet been received; and on March 24, a "Third request" was sent to 284 health officers and clerks of cities and villages, who were still delinquent.

On March 14, a "Second request for annual report" was sent to 1,018 health officers and clerks of townships from whom no report had been received. Many of the reports from townships have been received, but a "Third request" will soon be sent out to those still delinquent.

Of the 1,578 localities in Michigan, including townships, cities and villages, annual reports have been received from 1,397, leaving at the end of this quarter 181 localities delinquent. More reports are expected; and, compared with preceding years, there are fewer delinquent localities.

Reports of medical practitioners in their jurisdictions, have been received from 501 clerks of townships, cities and villages.

### *Work on Meteorology.*

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made for the use of this Office in connection with sickness statistics. The monthly summary has been sent at the end of each month to the Director of the Michigan Weather Service and Local Forecast Official at Detroit for his use; it is sent by him to the Chief of the U. S. Weather Bureau at Washington, D. C.

Ozone test-paper (supply for three months) was sent to each of sixteen meteorological observers in Michigan.

Diagrams "Cases and Deaths from Scarlet Fever in Michigan in 1891" and "Reported Deaths from Scarlet Fever in Michigan, 24 years, 1868-91" have been prepared, and photo-engraved plates made to be used in the Annual Report of this Board for 1892.

### *Accessions to the Library, Card-Cataloguing, etc.*

During the quarter 119 books and pamphlets and 351 numbers of journals (weeklies, monthlies, and quarterlies), have been received and entered in the library-accession book of this Office. The work on the card-catalogue of the library has been continued.

### *Work in Connection with Sickness Statistics.*

During the first quarter of 1894, 2,352 blank postal reports-cards, 159 record-books, 27 hektographed circular letters and 18 printed circulars regarding weekly card-reports, have been mailed to 152 health officers and regular correspondents; 1,287 weekly card-reports have been received and entered on the register; 53 copies of the hektographed weekly bulletin "Health in Michigan" were mailed each week and 106 copies of the monthly bulletin "Health in Michigan" have been hektographed and mailed each month. These bulletins have been consolidated for this quarterly report. Work has also been done on the compilation of the weekly card-reports of sickness during the year 1892, for the annual report for 1893.

### *Health in Michigan in the First Quarter of 1894. Communicable Diseases.*

Compared with the preceding quarter (October, November and December), reports from all sources show *scarlet fever* to have increased by an average of *nineteen* places, *diphtheria* to have decreased by an average of *three* places, *typhoid fever* to have decreased by an average of *forty-four* places, *measles* to have increased by an avearge of *seventeen* places and *small-pox* to have increased by an average of *three* places.

### *Meteorology and Sickness from All Causes, First Quarter of 1894, Compared with the Preceding Quarter.*

A comparison of meteorological conditions of the first quarter of 1894, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been the same (south-west), the average velocity 1.6 mile per hour greater, the temperature 7.44 degrees lower, the rainfall at Lansing 2.26 inches less, the absolute, and the relative humidity considerably less, the day ozone slightly more, the night ozone much less and the depth of the water in the well at Lansing two inches more in the first quarter of 1894.

Compared with the preceding quarter (October, November and December), the reports from regular observers show a marked increase of pleuritis, inflammation of kidney, pneumonia and influenza, and a marked decrease of diarrhea, remittent fever and intermittent fever in the first quarter of 1894.

### *The Weather and the Health in Michigan in the First Quarter of 1894, Compared with the Average for the Eight Years, 1886-1893.*

A comparison of the meteorological conditions of the first quarter of 1894, with the average for the first quarters in the eight years, 1886-1893, shows that in 1894, the prevailing direction of the wind was south-west (instead of north-west), the velocity was 1.6 miles per hour greater, the temperature was 4.82 degrees higher, the rainfall at Lansing was .54 of an inch less, the absolute humidity was more, the relative humidity was less, the day and the night ozone were much less and the depth of water in the well at Lansing was four inches more.

Compared with the average in the corresponding quarters in the eight years 1886-1893, the reports from regular observers indicate that intermittent fever, remittent fever, erysipelas, diarrhea, consumption, pneumonia and pleuritis were less than usually prevalent, and that no disease was more than usually prevalent in the first quarter of 1894.

## SECRETARY'S REPORT OF WORK DONE IN THE OFFICE OF THE STATE BOARD OF HEALTH, DURING THE QUARTER ENDING JUNE 30, 1894.

### *Communicable Diseases.*

The number of reports of outbreaks of dangerous communicable diseases in Michigan, received from all sources and filed, and concerning which action was taken by this office, during the quarter, are as follows: for diphtheria, 111; for scarlet fever, 176; for typhoid and typho-malarial fever, 61; for measles, 176; for small-pox, 32; and for consumption, 78. Total for the six diseases, 639.

The number of communications relative to dangerous communicable diseases, received and placed on filed during the quarter, was 2,144.

Relative to dangerous communicable diseases, letters, written cards, and demands for weekly and final reports on cards, or in the form of the circular letter, were sent out during the quarter to the number of 1,769.

The "final" reports of outbreaks received and filed during the quarter, were: for diphtheria, 94; scarlet fever, 135; typhoid and typho-malarial fever, 23; measles, 45; small-pox, 7; consumption, 0. Total for the six diseases, 304.

TABLE 1.—*Showing the number of Outbreaks of Diphtheria, Scarlet Fever, Typhoid Fever and Measles, from April 1 to June 30, 1894, of which notice was received at the office of the Michigan State Board of Health; the per cent of reports, information concerning which was received through the Newspapers; the per cent of newspaper reports which were confirmed by the health officer; the per cent of newspaper reports which were denied by the health officer; and the per cent relative to which no reply was received from the health officer.*

| Diseases. | Reports from *all* sources, April 1 to June 30, 1894. | Per cent of all reports which were obtained from the newspapers. | Per cent of newspaper reports which were confirmed by the health officer. | Per cent of newspaper reports which were denied by the health officer. | Per cent of newspaper reports to which the health officer made no reply to notice sent from this office. |
|---|---|---|---|---|---|
| Diphtheria | 111 | 3 | 0 | 67 | 33 |
| Scarlet fever | 176 | 8 | 60 | 0 | 40 |
| Typhoid fever | 61 | 7 | 25 | 50 | 25 |
| Measles | 181 | 6 | 40 | 20 | 40 |
| Small-pox | 32 | 25 | 25 | 75 | 0 |
| Consumption | 78 | 0 | 0 | 0 | 0 |
| Averages for the six diseases | ............ | 5 | 33 | 40 | 27 |

During the quarter, the local columns of 931 newspapers, have been looked over for reports of occurrence of communicable diseases. This has resulted in giving this office information of the alleged occurrence of 3 outbreaks of diphtheria, 5 outbreaks of scarlet fever, 4 outbreaks of typhoid and typho-malarial fever, 10 outbreaks of measles, and 8 outbreaks of small-pox. To what extent the reports of these alleged outbreaks were verified, is shown in the accompanying table.

The following is a synopsis of the

### *Reports Relative to Small-pox, Received During the Quarter:*

The *first* outbreak in the quarter occurred at Jackson. The outbreak began April 27, and ended May 27. A final report has been received. Number of cases 4, deaths 2. Source of contagium was: "Supposed to have been carried in the clothing of a lady visiting from Chicago, or that the lady was suffering from a mild case of varioloid."

The *second* outbreak occurred in Marquette. The outbreak began May 2; number of cases, 1; no deaths. A final report has been received. The source of contagium is given by the health officer as "Per steamer Peerless from Chicago."

The *third* outbreak occurred in Muskegon. The outbreak began May 6, and ended June 23. A final report has been received. Number of cases 3, deaths 1. Relative to the source of the contagium, the health officer says: "First case from Chicago, May 9, 1894."

The *fourth* outbreak, which still continues, occurred at Bay City, May 7. Relative to the source of contagium, the health officer states that the "patient came from Chicago." Up to the close of the quarter, there were reported five cases and one death in that outbreak.

The *fifth* outbreak occurred at Sturgis, St. Joseph county. The outbreak began May 10, and ended June 9. A final report has been received. Number of cases, 5; deaths, 4. The health officer gives the source of contagium as follows: "A tramp called at the water-works, where Lynch was an engineer, to rest and wash."

The Lynch family consisted of the father, mother and two children, who were all taken with the disease and died. The fifth case was the nurse, who had an attack of varioloid.

The *sixth* outbreak occurred in Grand Rapids, May 17, which was followed later by two or three other outbreaks, four cases having occurred in that city during the quarter. It is difficult to learn just whether the four cases constituted four separate outbreaks or whether more than one case belonged to the same outbreak. No deaths have been reported from that city, and the disease is still present there.

The *seventh* outbreak occurred in the city of Detroit, about May 28. Source of contagium not learned. Later another outbreak occurred at the Merchants hotel in that city. Source of contagium not learned. To the close of the quarter there have occurred 29 cases and 5 deaths in the city of Detroit. The disease is still present.

The *eighth* outbreak occurred in Berlin township, Monroe county, June 15. Source of contagium, Merchants hotel in Detroit. Number of cases, 2. No deaths reported at end of quarter.

The *ninth* outbreak occurred in Frenchtown township, Monroe county, June 16. Source of contagium, Merchants hotel, Detroit. There have occurred in this outbreak two cases. No deaths reported to the end of quarter. The outbreak still continues.

The *tenth* outbreak occurred in Farmington township, Oakland county, about June 18. Source of contagium, Merchants hotel, Detroit. This outbreak consisted of one case which died June 25. No new cases have been reported from that locality.

The *eleventh* outbreak occurred in Ypsilanti, June 20. Source of contagium not yet reported. So far only one case and no death has been reported from that city.

The *twelfth* outbreak occurred in Sturgis (which is the second outbreak which has occurred in that village during the quarter), June 21. Source of contagium unknown. One case in this outbreak at close of quarter. A second case has occurred since the close of the quarter, which the health officer infers was infected from the first case in this second outbreak.

The *thirteenth* outbreak occurred in Pontiac, June 25. Source of contagium not yet reported. Outbreak still continues, and seems to be confined to the first case.

The *fourteenth* outbreak was reported to this office, June 26, from Macomb township, Macomb county. Source of contagium given as "Detroit." So far only one case and no death has been reported from that locality.

Since the *close* of the quarter, an outbreak has been reported from Clayton township, Genesee county; source of contagium not given. Only one case has been reported from that locality thus far.

Alleged outbreaks, and rumors of outbreaks, of small-pox were reported from the following places during the quarter; Alpena; Napoleon township, Jackson county; Summit township, Jackson county; Moreland township, Muskegon county; Grand Ledge; Lockport township, St. Joseph county; Traverse City; Flint; Kalamazoo; Dalton township, Muskegon county; Springwells township, Wayne county; Richmond township, Macomb county; Wales township, St. Clair county; Lincoln township, Isabella county; Campbell township, Ionia county, and Lake Odessa, Ionia county. Upon investigation, it was learned that in most instances the reports of the outbreaks were mere rumors, and in other instances, the disease proved to be some other than small-pox.

### *Compiling, Editing, Proof-reading, Printing, etc.*

Articles relative to Measles, Small-pox, Whooping-cough, Hydrophobia, and Glanders, in Michigan in 1891, for the Annual Report for 1892, have been written; that on Diphtheria in Michigan in 1891 has been completed. The work in connection with preparing the "first part" of the Annual Report for 1892 has been completed. The work in connection with the preparation of the articles on "Meteorological Conditions in Michigan in 1892," and on "The Time of Greatest Prevalence of Each Disease in Michigan in 1892," has been continued.

A compilation of reports from health officers and clerks, relative to Diphtheria in Michigan in 1892, has been made, and the tables for the article on Diphtheria in Michigan in 1892, have been made. The proving of the compilation-blanks for Typhoid Fever in Michigan in 1892 is nearly completed. A type-written page of statistical evidence of the value of vaccination has been made.

Proof has been read on the articles relative to Diphtheria, Scarlet Fever, Measles and Small-pox in Michigan in 1891, for the Annual Report for 1892, and on a portion of the "first part" of the Annual Report for 1892.

Copy has been prepared, proof has been read, and the printing on the Proceedings of the Menominee Sanitary Convention has been completed, and it is expected that the pamphlet will soon be ready for distribution.

Printing on the Annual Report of the Secretary for the fiscal year ending June 30, 1892, has been nearly completed, and it is hoped soon to have the Report in completed form ready for distribution.

### *Hektograph Work, Correspondence, etc.*

About 3,350 pages of hektograph work have been made, of which about 700 pages were relative to small-pox in Michigan since January 1, 1894; about 350 pages being notifications of possibly infected immigrants; about 300 pages Inter-State Notifications of Small-pox in Michigan; about 200 pages relative to the proceedings of the Regular meeting of this Board, April 13, 1894, and about 200 pages relative to extracts from Dr. Baker's address, before the State Medical Society, on the "Relation of the State to Tuberculosis." The hektograph work has been about 1,000 pages greater than for the first quarter of 1894, which is probably due to the increased presence of small-pox in Michigan.

There were 1,282 pages of letter-book used in copying the correspondence of the Office, which does not include the many postal cards which have been sent out but not copied in the letter-book.

### *Annual Reports from Health Officers and Clerks for the Year 1893.*

During the quarter, annual reports have been received from 299 health officers and clerks of townships, cities and villages.

On April 20, a "Third request for annual reports" was sent to 586 health officers and clerks of townships, from whom no report had yet been received.

Of the 1,578 localities in Michigan, including townships, cities and villages, annual reports have thus far this year been received from 1,485, leaving at the end of this quarter 93 delinquent localities. A few more reports are expected, and, compared with preceding years, there is a marked decrease in the number of delinquent localities.

Reports of medical practitioners have been received from 113 clerks of townships, cities and villages.

### *Work on Meteorology.*

The regular tri-daily meteorological observations have been continued at this station, and a summary for each week and month during the quarter has been made for use in this Office in connection with the sickness statistics. The monthly summary has been sent at the end of each month to the Director of the Michigan Weather Service and Local Forecast Official at Detroit for his use; it is then sent by him to the Chief of the U. S. Weather Bureau at Washington, D. C.

Ozone test-paper (a supply for three months) was sent to each of 17 meteorological observers in Michigan.

Diagrams Nos. I., II., III., IV., VI., VII., VIII., IX., X., XI., XVI., relative to meteorology, and Diagrams Nos. 1, 2, 3, 4 and 5, on weekly reports of sickness in Michigan in 1892, were made, and are ready to be photo-engraved.

Diagrams: "Measles in Michigan, cases and deaths, etc., in 1891;" "Plat of Part of the City of Ann Arbor where occurred an outbreak of Diphtheria;" "Reported Deaths from Diphtheria in Michigan in each of the 24 years, 1868-91;" "Diphtheria in Michigan, cases and deaths in 1891;" have been prepared, and photo-engraved plates made, for use in the Annual Report for the year 1892.

Meteorological registers for the first three months of 1894 have been received, examined and compiled (barometer and humidity excepted), from each of the 11 stations in Michigan.

### *Accessions to the Library, Card Cataloguing, etc.*

During the quarter 166 books and pamphlets and 325 numbers of journals (weeklies, monthlies and quarterlies) have been received and entered in the library-accession book of this Office. The work on the card-catalogue of the library has been continued.

### *Names and Addresses of Health Officers for 1894–5.*

A circular letter of instruction and blank form for the return of the name and address of the heath officer, together with an addressed envelope, were sent to each of the supervisors of townships, presidents and clerks of villages, and mayors and clerks of cities. June 4–6, a *second* demand for the return of the name and address of the health officer was made to 581 clerks of townships, clerks of cities and villages.

There have been returned to this Office the names and post-office addresses of 1,362 health officers of townships, cities and villages. These facts have been entered on the health-officer's books, and the reports have been placed on file. To each health officer returned, there have been sent a set of the pamphlets on the restriction and prevention of the different dangerous diseases, two copies of the outbreak report blank and one sample copy of the blank for keeping a local record of the cases of diseases dangerous to the public health. Copies of the same pamphlets, blanks, etc., were sent to each person making the return of the name and address of the health officer.

### *Distribution of Publications, etc.*

Copies of the printed Proceedings of the Regular meeting of this Board, April 13, 1894, to the number of 1,025, were sent to: Members and ex-members of this Board, sanitary journal exchanges, meteorological observers for the State Board of Health, members of the State Board of Corrections and Charities, secretaries of other State and Provincial Boards of Health, secretaries of State medical societies, libraries, correspondents, health officers in other States, and health officers of cities and villages in Michigan.

About 2,000 copies of the Announcement and about 2,800 copies of the Program of the Second Annual Conference of Michigan health officers at Ann Arbor, June 14 and 15, 1894, were distributed to mayors, clerks, and health officers of cities, presidents, clerks and health officers of villages, supervisors, clerks and health officers of townships in Michigan; to members of this State Board; about 120 of the prominent newspapers in the State; Secretaries of State Boards of Health; and others.

The pamphlet on the restriction and prevention of small-pox, a copy of the leaflet "Now is a good time to be vaccinated" and six copies of a two page leaflet relative to "Local Quarantine Regulations" were sent to thirty-six presidents of villages and twenty-four mayors of cities located on or near the Great Lakes or other navigable waters in Michigan. Two copies of the leaflet on Local Quarantine Regulations were sent to health officers of 85 townships containing lake or river ports, and five copies were sent to each of 47 health officers who are also supervisors of townships located on the Great Lakes or other navigable waters in Michigan. One copy of the leaflet urging vaccination and four copies of the leaflet urging the adoption of Local Quarantine Regulations were sent to each of 122 supervisors of port townships.

The pamphlet on the restriction and prevention of small-pox, the leaflet on vaccination, and five copies of the leaflet on Local Quarantine Regulatios were sent to 285 health officers of townships in Michigan. Four copies of the leaflet on vaccination and one copy of the pamphlet on small-pox were sent to each of 118 prominent newspapers in Michigan; and two copies of the leaflet relative to Local Quarantine Regulations were sent to each of 67 editors of newspapers published in places located on the Great Lakes and other navigable waters in Michigan.

To each supervisor was sent a copy of the blank for the return of the name, address, etc., of medical practitioners; and, in cases where there was a village in the township, an extra copy of the blank was sent; one copy for the clerk of the township and one copy for the clerk of the village. Two copies of the blank were sent to the clerk of each city in Michigan.

A copy has been made of the list of supervisors and clerks as they are returned to the Office of the Secretary of State.

About the usual numbers of pamphlets on the restriction and prevention of the different dangerous diseases were sent to the health officers of localities in which dangerous diseases had been reported. It was at the same time requested of these health officers that the pamphlets be distributed to the neighbors of the persons sick with such diseases, and to such other persons as they would be likely to benefit.

In response to special request of sanitarians in this and other States, copies of the Annual Reports, proceedings of meetings and sanitary conventions and pamphlets on the restriction and prevention of the dangerous communicable diseases, have been sent where it was thought likely they would benefit public-health interests.

The usual accounts of the Office have been kept.

An invoice of the circulars, envelopes and paper on hand at the end of the fiscal year ending June 30, 1894, has been taken.

The Secretary's annual report of property purchased, issued, destroyed and remaining on hand July 1, 1894, has been made.

### *Menominee Sanitary Convention.*

The fortieth Sanitary Convention, under the auspices of the State Board of Health, has been held at Menominee, April 5 and 6, 1894, and was a very successful one. The printing on the pamphlet proceedings of that convention has been completed, and it is hoped to soon have the pamphlet ready for distribution.

### *Public Health Work in Connection with the State Medical Society.*

In reprinting the pamphlet relative to the State Board of Health Exhibit at the World's Columbian Exposition, a page of text descriptive of that part of the exhibit which consisted of the diagrams, was prepared and published under the title "Brief Outline of the Exhibit." The pamphlet was reprinted in order to distribute copies of it at the State Medical Society which met this year in Lansing. The diagrams mounted on the Standard of Wing Frames and the larger diagrams were exhibited to members of the society in one of the committee rooms, adjoining the room in which the meetings of the society were held. Your Secretary prepared and delivered at that meeting of the State Society an address on "The Relation of the State to Tuberculosis." (He has since received a few reprints of that address, for distribution to persons interested in the subject.)

A special meeting of this Board having been called at Lansing at that time for the examination of plans for a public building, at Lapeer, several of the members of this Board attended some of the sessions of the medical meeting, especially the general Conference relative to Tuberculosis, in the discussion of which Prof. Vaughan took part, and Prof. Novy read a paper.

### *Conference of Representatives of State Boards of Health in Chicago.*

The Executive Committee of the National Conference of State Boards of Health had been considering the advisability of calling a meeting of the Conference, on account of the prevalence of small-pox in the United States, and especially in Chicago. The Secretary of the Michigan Board, as a member of the Executive Committee, suggested that the Conference be held in Chicago, and restricted to a few of the States especially endangered by the small-pox in Chicago. Accordingly Dr. C. O. Probst, Secretary of the Conference, and Secretary of the Ohio State Board of Health, called a meeting of delegates of the State Boards of Health of Indiana, Wisconsin, Minnesota, Kentucky, Iowa, Missouri, Illinois, Ontario and Michigan. The meeting was held at the Grand Pacific hotel, in Chicago, May 9 and 10, 1894. I have written out a brief report of the meeting, and submit it herewith.

(The Secretary's brief report is printed on subsequent pages of this Report.)

Recently, I have received from Dr. Probst, the Secretary of the Chicago meeting, a much more full and complete report, which is also submitted herewith. (It is too long to be here reproduced.)

### *Local Quarantine Regulations.*

It being known to the Secretary of this Board that small-pox was very prevalent in Chicago, and widespread throughout the world, he considered that "The danger from small-pox is now imminent." Accordingly he prepared a circular to the officers of local boards of health at ports on the Great Lakes and other navigable waters in Michigan, calling attention to the danger of the introduction of small-pox, the importance of making and publishing regulations relative to quarantine, relative to the introduction of dangerous diseases, and to the proper management of isolation hospitals, including vessels and houses in which a dangerous disease remains. This circular was submitted to members of the Board, unanimously approved, and it issued from the Office May 19. We have received from a number of local ports about the State published regulations in accordance with the recommendations of that circular.

### *Publication of Slip Relative to the Prevention of Consumption.*

In the last month of the quarter, the slip heretofore printed and widely distributed consisting of the resolution of this Board declaring consumption to be a disease dangerous to the public health, was modified, by printing upon the back of it a condensed summary of the leaflet issued by this Board on the "Restriction and Prevention of Consumption." Five thousand of these slips were printed, and they are being widely distributed about the State. The slip is of convenient size to be inserted in the ordinary letters sent out from the office. The slip is as follows:

## CONSUMPTION IS A DISEASE DANGEROUS TO THE PUBLIC HEALTH.

### IT SHOULD BE REPORTED TO THE HEALTH AUTHORITIES.

RESOLUTION ADOPTED BY THE MICHIGAN STATE BOARD OF HEALTH,
SEPTEMBER 30, 1893.

"*Resolved*, That hereafter, consumption (and other diseases due to the *Bacillus tuberculosis*) shall be included in the official list of 'Diseases dangerous to the public health,' referred to in sections 1675 and 1676 Howell's Statutes, requiring notice by householders and physicians to the local health officer, as soon as such a disease is recognized."

[In this resolution the question of isolation of the patient is not mentioned. Its purpose is to secure to the local health authorities and to the State Board of Health information of the location of each case of this most dangerous disease, with the view of placing in the hands of the patient, reliable information how to avoid re-infecting himself or herself or giving the disease to others, and in the hands of those most endangered, information how to avoid contracting this disease. HENRY B. BAKER, *Secretary*.]

(REVERSE SIDE)

### THE PREVENTION OF CONSUMPTION.

Consumption is the most destructive disease, the number of persons dying annually from this cause in Michigan amounting to about three thousand.

Consumption is a dangerous communicable disease, the most dangerous one in Michigan. One consumptive may spread the disease to very many healthy persons. The chief danger exists in the expectoration of the consumptive person, and if this expectoration is carefully destroyed before it is dried little danger need be feared.

Consumptives should be instructed not to spit upon sidewalks, the floors of rooms, public halls, street and railway cars, and other vehicles, nor where fowls or dairy cows may take in the sputum or the dust of it with their food. They should spit into pieces of cloth, or receptacles made for the purpose, containing a saturated solution of carbolic acid (one part of carbolic acid crystals to about 15 parts of water). Such pieces of cloth should be destroyed by fire, before the sputa become dry, and other receptacles should be cleansed with scalding water, their contents having been destroyed or otherwise carefully disposed of. Handkerchiefs which may have been used from necessity should be boiled half an hour before washing.

It is best that all persons who have a cough should carry small pieces of cloth (each just large enough to properly receive one sputum) and paraffined paper envelopes or wrappers in which the cloth, as soon as once used, may be put and securely enclosed and, with its envelope, burned on the first opportunity.

Remember that sputa must never be allowed to become dry.

OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH,
*Lansing, Michigan, June, 1894.*

### *Demand for Investigations of Alleged Contagious Diseases.*

The small-pox has caused many requests for investigation by the State Board of Health. Two classes of interest have requested these investigations. (1.) Where suspected cases of small-pox were causing injury to business interests, such investigations have been asked for. In such cases, where the local board of health was giving the public safety the benefit of the doubt, it has been found practicable to get along without the investigation. In one instance, at Sturgis, it was alleged that the money interests of the town were being sacrificed, the case of suspected small-pox being alleged to be nothing more than ivy poisoning. The case being carefully isolated by the local health officer, I was able to assure the people that there was believed to be no danger from contracting small-pox in Sturgis. Subsequent events proved that the case was really small-pox, but it is believed that it will be restricted.

(2.) In one instance the public fear was that a case liberated by the health officer and local board of health might yet be small-pox. In this case, on consultation with the president of the Board, an inspector was employed by this Board to visit the locality and investigate the case. It proved to be not small-pox.

One occasion for an investigation has arisen by reason of a suspected case of typhus fever. This is a disease so rare in this State that I was not able to find an expert who could be secured to visit the locality, and investigate the case. The local health officer was himself inclined to believe it typhus. I telegraphed him as follows:

"*Lansing, June 29, 1894.*

"C. W. Huff, *Health Officer, Gobles, Mich.:*

"Cannot find expert tonight, may tomorrow. Best enforce absolute isolation of all infected, and disinfect thoroughly. Keep me informed."

"Baker, *Secretary.*"

Since that time I have been writing and telegraphing to different localities, but have not yet learned whether the disease is actually typhus, or typhoid fever.

### *Joint Meeting of State Board of Health and State Live Stock Commission.*

This meeting was held at Ann Arbor, June 15. It was for the purpose of conference relative to the restriction and prevention of tuberculosis in man and in animals. The Secretary of this Board was made Secretary of that meeting, and has copied out at length the notes he then made. The report of that meeting is submitted herewith. [It is printed on a preceeding page.]

### *"Local Health Regulations."*

#### *"To Prevent the Introduction and Spread of Dangerous Diseases."*

After the preparation and publication of the leaflet entitled "Local Quarantine Regulations," which was issued to officers of local boards of health at lake and river ports in Michigan, it was considered still more important that the officers of all local boards of health throughout the State should have before them the sections of law bearing on the prevention of the introduction of dangerous diseases, and suggestions which would enable them to most effectually act for the prevention of the introduction of small-pox. The Secretary considered it an opportune time to persuade local boards of health generally throughout the State to make and publish "regulations" without which local boards are nearly powerless to prevent the introduction of any disease, or to punish a person who wilfully brings within their jurisdiction an infected person or dead body, and thus introduces a dangerous disease. Without such regulations, isolation hospitals or houses, boats or vessels in which dangerous diseases occur cannot be properly managed. To place before the local boards of health in Michigan the sections of law on this subject, a circular was prepared by the Secretary of this Board, and submitted to the members of this Board for amendment or approval. One or two members approved, one or two members disapproved, and the President of the Board submitted a substitute. It was found impracticable to issue the circular. The Secretary considered and still considers it important that such a circular be issued. Unless the Supreme Court soon decides the case involving the quarantine powers of the State Board of Health, and decides that the State Board has such quarantine powers as the present law specifies, it would seem to be exceedingly important that the local boards of health do everything that is possible under existing laws to prevent the introduction of disease. The present indications are that there will continue to be great danger from small-pox during the coming winter and spring. And the subject is even of greater importance relative to other dangerous diseases more prevalent than small-pox. [At this meeting of the Board, the subject was referred to Prof. Fall, for report at the next meeting.]

### *Pamphlet on the Restriction and Prevention of Consumption.*

The supply of copies of the leaflet on the Restriction and Prevention of Consumption having given out, during the interval between meetings, the Secretary submitted the pamphlet to the members, with a request for amendment or approval, or both. The reprinting of the pamphlet was approved, and an edition of 10,000 copies was printed in June. The third edition is practically the same as the second, only that a note relative to the examination of suspected sputa was added.

### *Publication of Diagrams Relative to Vaccination.*

For use in teaching the importance of vaccination, a four-page leaflet has been prepared and printed, consisting of diagrams exhibiting the great decrease in mortality from small-pox in many countries, dating from the time of the introduction of vaccination. These diagrams were Nos. 4, 5, 6 and 7 of a series constructed by Mr. Willitts to illustrate his paper on "Achievements of Sanitation," and the plates were in this office.

For the conference of health officers at Ann Arbor, a brief article on this subject was prepared and presented by the Secretary.

### *Second Annual Conference of Michigan Health Officers, at Ann Arbor.*

The Second Annual Conference of Health Officers in Michigan was held at the State Laboratory of Hygiene, University of Michigan, June 14 and 15 and was a very successful and instructive meeting. The preparation for it, and the collection of the minutes of the meeting, papers read, and discussions, has involved considerable labor in this Office, which it is believed has been profitably exerted.

### *Moving Store-room of State Board of Health Office.*

It has been found necessary to vacate the room on the north of the west corridor, heretofore occupied by three clerks of this Office. In order to prepare the basement room under the Office so that it can be occupied by clerks it has been necessary to remove the Annual Reports, Vital Statistics and other property of the Board to a room in the Old State Office Building. This removal has been made, and has involved considerable labor. The books and other property are now stored in room No. 16 of the Old State Office Building. A book has been planned and made in which is to be kept a "Record of Annual Reports, Volumes of Vital Statistics, Circulars, Documents and other Property transferred to and from the Office of the Michigan State Board of Health, in the State Capitol, and to and from the Old State Office Building, corner of Washington Ave. and Allegan street, Lansing, Michigan."

### *Special Meetings of the State Board of Health.*

Since the regular quarterly meeting held in Lansing, April 13, special meetings of this Board have been held as follows: At Lansing, May 3 and 4; at Lansing, June 2; at Ann Arbor, June 15, 1894.

A special meeting of the Board was called to meet in Lansing, May 3 and 4, during the meeting of the State Medical Society, for the purpose of examining the plans and specifications for the proposed Home for the Feeble Minded at Lapeer. The plans were examined, and, with a few recommendations, were adopted.

A special meeting of the Board was called to meet in Lansing, May 17, to examine the plans and specifications of the proposed "Upper Peninsula Asylum for the Insane". Information having been received that the plans would not be ready for examination May 17, the meeting was canceled. Later another call was made by the President for a meeting June 1, for the same purpose. Only the President and Secretary were present, but they acted for the Board, made the examination, and also made a few recommendations, relying upon the Board to confirm their action at some future meeting. (The Board confirmed the Officers' report at the meeting, June 15, 1894.) A call was issued for a special meeting of the State Board of Health, at Ann Arbor, June 14 and 15, during the intervals of the sessions of the Second Annual Conference of Michigan Health Officers, for the auditing of bills and accounts, and for the purpose of a joint-meeting with the State Live Stock Commission, to consider the subject of the restriction and prevention of tuberculosis in man and in animals. The joint meeting was first held, and proved to be a very instructive meeting, and later in the same day (June 15), the State Board of Health held a special meeting. Bills and accounts were allowed, and the report upon the examination of the plans for the Upper Peninsula Asylum by the President and Secretary was confirmed. The proceedings of the meeting June 15, are submitted herewith.

[The proceedings of the joint meeting are printed on pages xlii–xlv of this publication.]

With a recent weekly bulletin, there was sent to newspapers a hektograph slip, as follows:

THERE IS NO REMEDY FOR SMALL-POX. IT SHOULD BE PREVENTED BY VACCINATION.

Anything which belittles vaccination, the true preventive of small-pox, is against public policy. Newspapers can do much good to humanity by learning and spreading the truth; they can also do much harm by spreading false doctrines. Every time small-pox appears newspapers do much harm by publishing the mischievous falsehood inserted below as "a small-pox remedy" which is always stated to be "going the rounds of the papers."

"A SMALL-POX REMEDY.

"Here is Another Said to be a Sure Cure.

"The following statement of a correspondent of the Stockton, California, Herald has been going the rounds of the papers. An ex-Californian says he has seen it tested with entire success. We produce it. therefore, for what it is worth.

"I herewith append a recipe which has been used, to my knowledge, in hundreds of cases. It will prevent or cure the small-pox, though the pittings are filling. When Jenner discovered cow-pox in England the world of science hurled an avalanche of fame upon his head, but when the most scientific school of medicine in the world—that of Paris—published this recipe as a panacea for small-pox, it is passed unheeded. It is as unfailing as fate, and conquers in every instance. It is harmless when taken by a well person. It will also cure scarlet fever. Here is the recipe, as I have used it, and cured my children of the scarlet fever; here it is as I have used it to cure the small-pox. When learned physicians said the patient must die, cured. Sulphate of zinc, one grain; fox glove (digitalis), one grain; half a teaspoonful of sugar; mix with two tablespoonfuls of water. When thoroughly mixed add four ounces of water. Take a teaspoonful every hour. Either disease will disappear in 12 hours. For a child, smaller doses according to age. If counties would compel their physicians to use this, there would be no need of pest houses. If you value advice and experience, use this for that terrible disease."

It is about time that all respectable newspaper editors know the truth—that vaccination is the preventive of small-pox, and that *no* remedy is known, and that there is no probability that any ever will be known which will cure scarlet fever or small-pox; and if one shall be discovered its publication may well wait until the truth of it shall have been attested by a State Board of Health or some other intelligent guardian of the lives of the people. Meantime the publication of such an article as the above ought to be punished by a fine and imprisonment. Respectfully submitted, HENRY B. BAKER.

*Lansing, Michigan, July 3, 1894.*

## *Work in Connection with Sickness Statistics.*

During the second quarter of 1894, 4,200 blank postal report-cards, 285 record-books, 116 hektographed circular letters and 172 printed circulars regarding weekly card-reports, have been mailed to 269 health officers and regular correspondents; 1,254 weekly card-reports have been received and entered on the register; 53 copies of the hektographed weekly bulletin "Health in Michigan," were mailed each week, and 110 copies of the monthly bulletin "Health in Michigan" have been hektographed and mailed each month. These bulletins have been consolidated for this quarterly report. Work has also been done on the compilation of the weekly card-reports of sickness during the year 1892, for the annual report for 1893.

### *Health in Michigan in the Second Quarter of 1894. Communicable Diseases.*

Compared with the preceding quarter (January, February and March), reports from all sources show *scarlet fever* to have decreased by an average of *seven* places, *measles* to have increased by an average of *sixty-seven* places, *diphtheria* to have increased by an averarge of *one* place, *typhoid fever* to have decreased by an average of *seven* places and *small-pox* to have increased by an average of *six* places.

### *Meteorology at one Central Station, and sickness Throughout Michigan from all Causes, Second Quarter of 1894, compared with the Preceding Quarter.*

A comparison of meteorological conditions of the second quarter of 1894, with the meteorological conditions of the preceding quarter, shows the prevailing direction of the wind to have been north west (instead of south west), the average velocity 3.1 miles per hour less, the temperature 27.76 degrees higher, the rainfall 2.32 inches more, the absolute humidity much more, the relative humidity slightly less, the day and night ozone considerably more and the depth of water in the well at Lansing two inches more in the second quarter of 1894.

Compared with the preceding quarter (January, February and March), the reports from regular observers show a marked increase of measles, diarrhea and itermittent fever, and a marked decrease of influenza, pneumonia and pleuritis in the second quarter of 1894.

### *The Weather and the Health in Michigan in the Second Quarter of 1894, Compared with the Average for the Eight Years, 1886–1893.*

A comparison of the meteorological conditions of the second quarter of 1894, with the average for the second quarters in the eight years, 1886-1893, shows that in 1894, the prevailing direction of the wind was north-west (instead of south-west), the velocity was slightly greater, the temperature was 1.35 degrees higher, the rainfall was .65 of an inch more, the absolute and relative humidity were slightly more, the day ozone was less, the night ozone was more, and the depth of water in the well at Lansing was the same.

Compared with the average in the corresponding quarters in the eight years 1886-1893, the reports from regular observers indicate that intermittent fever, erysipelas, and remittent fever were less than usually prevalent, and that scarlet fever was more than usually prevalent in the second quarter of 1894.

HENRY B. BAKER,
*Secretary.*

## GENERAL REPORT OF WORK IN THE OFFICE OF THE SECRETARY OF THE STATE BOARD OF HEALTH DURING THE FISCAL YEAR ENDING JUNE 30, 1894.

Much of the work of the office naturally groups itself under three closely related heads,—the collection of information, the compilation and elaboration of information, and the dissemination of information. In the following outline that grouping is adhered to so far as is practicable without repetition.

### COLLECTION AND COMPILATION OF INFORMATION.

#### COLLECTION OF INFORMATION RELATIVE TO HEALTH OFFICERS IN MICHIGAN.

There is a local board of health in every township, and in every incorporated city and village in Michigan.

Every local board of health in Michigan is required by law to appoint and constantly have a health officer, and to report his name and address to the Secretary of the State Board of Health at Lansing.

Blanks for the return of the names and addresses of health officers are sent out by the Secretary of the State Board of Health to the local officers about the first day of April, the law (§1634 Howell's Statutes), requiring the appointment and return to be made "within thirty days after the annual township meeting in each year."

In April, 1894, the usual demand was made upon supervisors of townships, presidents and clerks of villages, mayors and clerks of cities, for the returns of the names and postoffice addresses of health officers to serve in 1894–95. The circulars and blank forms used are similar to those printed on page xiii-xiv of the Report for 1884. In June, 1894, a second demand was sent to localities from which no return had been made in response to the demand in April.

On the outbreak of a dangerous communicable disease in a township, city or village for which no health officer has been reported, a third, and even a fourth demand for the appointment of such officer, and the return of his name, is generally made. Through the systems of reports to the State Board of Health by its corps of correspondents, as well as by the local health officers, and by a systematic searching of the local columns of the country newspapers published in Michigan, the Secretary of the State Board often receives information of an outbreak of a communicable disease, and desires to communicate at once with the health officer; but if no health officer has been appointed in that locality, or no return of such appointment has been made, delays occur, and before the Secretary of the State Board can get into correspondence with the delinquent local board, and a health officer can be chosen, the disease may spread widely within or without the limits of the village or township, with unnecessary sickness and loss of life.

### SPECIAL REPORTS RELATIVE TO DANGEROUS COMMUNICABLE DISEASES.

Every health officer is supplied with blanks "L" from this office, for reporting outbreaks of diphtheria, typhoid fever, scarlet fever, small-pox, measles, etc., (dangerous communicable diseases) to the Secretary of the State Board of Health, as required by law.

Upon the receipt of the report of an outbreak of such disease, blanks "M" for weekly reports during the outbreak, are sent, with circular letter ("Blue Letter"),* also a number of pamphlets containing instructions for the suppression of the disease. These pamphlets are to be distributed to the neighbors of the family in which the disease is, in order to obtain their coöperation with the health officer.

About 1,918 outbreaks of such diseases were thus attended to during the fiscal year ending June 30, 1894.

Later a blank is sent to each such locality for a final report at the close of the outbreak, asking questions concerning just what was done for the restriction of the disease, and with what result, the number of cases and deaths, households invaded or infected, what disinfectants were used, in what quantities, and other facts supply reliable and important data for future efforts in showing the results of the practical work of local boards in preventing and restricting disease, in accordance with recommendations of the State Board. The facts thus collected are compiled for publication in the Annual Report of the Secretary.

A compilation of these facts relative to the dangerous communicable diseases in Michigan during the year 1893, will be found on subsequent pages of this Report, commencing on page 149 in Part II.

### SICKNESS STATISTICS; WEEKLY POSTAL-CARD REPORTS OF ALL IMPORTANT DISEASES IN 1893-94.

The weekly postal-card reports of diseases, sent on cards supplied by the State Board of Health, have been received from health officers of cities and villages and other leading physicians, who contribute this valuable information from different parts of the State. The plan of these weekly card-reports is stated on pages 82 and 83 of this Report; on page 83 is an example of the reports properly filled out. When a report of a new health officer of a city or village is received, a printed letter is sent (if health officer of a village it is number [180], if of a city a similar letter is sent) with a circular [129] describing the plan of the reports, and transmitting supplies for making them.

A list of observers for the calender year 1893 and a compilation of their reports, with a study of relations of sickness to climatic conditions is printed in this Report, pages 81–148. The sickness statistics of Michigan, based upon these weekly reports by the leading physicians in the State, are probably the most important statistics in the world. They are also made especially useful for the purpose of studying the causation of diseases, by reason of the excellent system of meteorological statistics which have now been collected during such a long series of years as to make them exceedingly useful for such combinations.

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* Description of this circular "Blue Letter," is printed on page 274, of this Report, and a copy of such a letter, relative to typhoid fever, is printed on page lxxxvi.

### ANNUAL REPORTS BY HEALTH OFFICERS FOR THE YEAR ENDING DEC. 31, 1893.

In Decmber, 1893, a circular [201], was sent to the health officer of each township, city and village in the State, about 1,581 in all, transmitting a blank form "I" for use in making his annual report to this Office. This circular was substantially the same as circular (65), which is printed on pages viii-ix of the Report for 1884. Blank form "I," for reports of health officers, is printed in former Reports. With the circular 190 was also transmitted a blank sheet for a record of diseases dangerous to the public health, similar to the blank which is printed, reduced in size, on page 271 of the Report for 1882.

Where the name of the health officer has not been returned to this office, the blanks were sent to the president of the village, the mayor of the city, or the supervisor of the township, according as the vacancy occurred in the village, city or township.

### ANNUAL REPORTS BY CLERKS OF LOCAL BOARDS OF HEALTH FOR THE YEAR ENDING DEC. 31, 1893.

At the same time (December, 1893) that the circulars and blank forms were sent to the health officers, a circular [200] asking for a report, and a blank form "J" on which to make a report, were sent to the clerk of the local board of health of each township, city and village in the State, about 1,581 in all. A blank for a copy of his record of cases of diseases dangerous to the public health was also sent; the circular and blank form sent to the clerk were similar to those sent to the health officer, except that they were not so explicit in questions relating to sickness and deaths.

### RETURN OF NAMES OF MEDICAL PRACTITIONERS.

About January 1, 1894, blanks for the return of names of medical practitioners were sent to each of the clerks of the townships, cities and villages, about 1,600 in number. An example of these blanks is printed on page xi of the Report of the Board for 1888.

### METEOROLOGICAL REPORTS.

A list of meteoroloigcal observers for the calendar year 1893, with a statement of what registers were received from each, is printed in this Report. The reports are summarized in an article in this Report on the "Principal Meteorological Conditions in Michigan in 1893," which is printed on pages 180. The data are of great value for the purposes of studying the causes of diseases. The observations made at the Office of the Board, at Lansing, have been summarized weekly, and a copy kept on file in the office.

## DISSEMINATION OF INFORMATION.

### PUBLISHED LIST OF NAMES AND ADDRESSES OF HEALTH OFFICERS.

The names and addresses of 1,328 health officers in Michigan were printed in August, 1893, and a copy sent to each health officer in Michigan, in order to facilitate his ready notification, to the health officer of any locality in this State, concerning the possible spread of any dangerous communicable disease; also to facilitate correspondence on any of the numerous questions with which health officers have to deal. The pamphlet was also sent to each of the delinquent boards of health, in the hope that, on seeing the blank where there should be the name of a health officer they would then comply with the law which requires the appointment of a health officer and the return of his name. In some instances that was the result. The pamphlet has also been useful, in the office of the State Board of Health, for several other purposes.

### DISTRIBUTION OF INFORMATION HOW TO RESTRICT AND PREVENT DANGEROUS DISEASES.

Whenever information is received of the occurrence of diphtheria, scarlet fever, measles, small-pox, typhoid fever, or typho-malarial fever, copies of a document on the restriction and prevention of the disease reported are immediately sent to the health officer, with a request that he distribute them where they will be likely to be most read, and it is suggested that the neighbors of those families in which the sickness is present would be most likely to read them at such times of danger; and it is thought that after reading them they will be most likely to co-operate with the local health officer for the restriction of the diseases. Thousands of pamphlets relating to each of the most dangerous communicable diseases are distributed by the State Board in this manner—in localities where the disease treated of in the pamphlets is present. They are being distributed in this way constantly, because there is no time when the State is free from scarlet fever or diphtheria, these being among the most important of the dangerous communicable diseases in Michigan. Copies of the documents on diphtheria, scarlet fever, and small-pox, in German or in the Dutch language, are also sent when it is thought they can be used to advantage. Owing to the frequent requests for documents in French, Polish, Swedish and Danish-Norwegian, translations of a leaflet on contagious diseases [47] have been made into each of these languages; and copies are sent to local boards when so requested.

A record is kept of reports received and of correspondence relative to each outbreak of a dangerous communicable disease of which the office receives information. A compilation of such information relative to several of the most important diseases is published in this volume.

### PRINTING AND DISTRIBUTION OF THE SECRETARY'S ANNUAL REPORT.

Comparatively few of the Annual Reports of the Secretary are published. The whole number published is not as large as the whole number of officers and members of local boards of health in Michigan. Only about 6,000 copies of the Annual Report are published for all purposes.

A little over half of these (3,500 copies) are at the disposal of the State Board of Health. These reports are to exchange with sanitary journals, with other State Boards of Health, with boards of health in other cities and countries, with State and sanitary libraries, and to supply physicians in Michigan who contribute to the work of the Board. Michigan is a great and prosperous State, and it is believed that it is made richer, not poorer, by the influences exerted by the publications of the Michigan State Board of Health.

### PRINTING AND REPRINTING LEAFLETS, PAMPHLETS, DIAGRAMS, ETC., OF INFORMATION.

The pamphlet relative to the Michigan State Board of Health Exhibit at the World's Fair was printed to the number of about 3,100 and widely distributed at the Fair. On subsequent pages of this Report the pamphlet will be found in connection with a statement regarding the Board's exhibit at the Fair.

In September, 1893, 10,000 copies of the pamphlet [176.] "The Restriction and Prevention of Measles" were printed for distribution.

In October, 1893, the law (Act 47, laws of 1893) under which the Board acted for the "Inspection of Immigrants and Travelers" was printed to the number of 500 copies. The law is as follows:—

## THE MICHIGAN LAW

FOR THE

## PREVENTION OF THE INTRODUCTION AND SPREAD OF CHOLERA AND OTHER DANGEROUS COMMUNICABLE DISEASES.

### Act No. 47, Laws of 1893.

An act to amend sections one, two and three of act number two hundred and thirty, laws of eighteen hundred and eighty-five, approved June twentieth, eighteen hundred and eighty-five, entitled "An act to provide for the prevention of the introduction and spread of cholera and other dangerous communicable diseases," and to add four new sections thereto to stand as sections four, five, six and seven.

SECTION 1. *The People of the State of Michigan enact,* That sections one, two and three of act number two hundred and thirty of the public acts of eighteen hundred and eighty-five, approved June twentieth, eighteen hundred and eighty-five, entitled "An act to provide for the prevention of the introduction and spread of cholera and other dangerous communicable diseases," be and the same are hereby amended, and four new sections are added thereto to stand as sections four, five, six and seven, so that said section, as amended and the sections added thereto shall read as follows:

SECTION 1. Whenever it shall be shown to the satisfaction of the State Board of Health that cholera, diphtheria, or other dangerous communicable disease exists in any foreign country, neighboring State, or locality within this State, whereby the public health is imperiled, and it shall be further shown that immigrants, passengers or other persons seeking to enter this State or to travel from place to place within this State, are coming from any locality where such dangerous communicable disease exists, and are likely to carry infection of such dangerous communicable disease, the State Board of Health shall be authorized to establish a system of quarantine for the State of Michigan or for any portion thereof.

SEC. 2. Such quarantine shall be for the purpose of preventing all immigrants, passengers or other persons under the circumstances mentioned in section one of this act, from entering the State or from going from place to place within the State, who, in the opinion of the State Board of Health, or in the opinion of an inspector duly appointed by said Board are likely to carry infection of cholera, small-pox, diphtheria or other dangerous communicable disease; and for the detention of all such persons outside the borders of the State, or if already within the State, at the places where they may be or at the place they have been exposed to or have contracted such dangerous communicable disease, or at such suitable place as such Board may provide, during the period of the incubation of such disease, or of its existence if already developed, and until in the opinion of the State Board of Health such persons are free from all danger of infection.

SEC. 3. The State Board of Health is authorized to establish general rules, and by an inspector acting by virtue thereof, to detain railroad cars or other public or private conveyances whenever it shall be shown to the satisfaction of such Board, or to the inspector as provided in such rules, that such cars or other conveyances contain any passenger, person or property which has been exposed to cholera, diphtheria, or other dangerous communicable disease, or when it shall be shown to the satisfaction of such Board or inspector as aforesaid, any passenger, person or property, are being transported on such railroad cars or other public or private conveyance from any locality within or without this State where any such dangerous communicable disease exists and where under the circumstances shown to such Board, such persons or property are likely to carry infection of such dangerous communicable disease. In such case said Board may, by its duly constituted inspectors, remove , isolate, place under the care of local boards of health, order to be returned to the places whence they came, or dispose of in any other manner it may consider proper, all railroad cars, or other conveyances, all passengers in such railroad cars or other conveyances, when there is reason, as aforesaid, to believe such may have contracted or become infected with any dangerous communicable disease, or have been exposed or infected by any such disease in a manner likely to render them bearers of infection. In case any person or property is detained by an inspector, for any of the purposes mentioned in this act, the party or parties interested shall have a right to a hearing before the said Board, and the decision of such Board shall be final.

SEC. 4. All such persons, their baggage and other personal effects, and all such conveyances shall be disinfected under such rules and regulations as the State Board of Health may establish for the purpose of carrying into effect the provisions of this act, before such persons or baggage or conveyances shall be permitted to enter the State, or to proceed to their or its destination if already in the State.

Sec. 5. The State Board of Health is hereby authorized to cause the disinfection of goods, merchandise, conveyance or other property which they have reason to believe may carry the germs of cholera or other dangerous communicable disease, and under the circumstances mentioned in sections two and three of this act, to prohibit the entry of such goods, merchandise or other property into the State, or their being moved if within the State, until such disinfection shall be accomplished.

Sec. 6. It shall be the duty of the State Board of Health to frame and publish rules for the inspection, isolation, detention and disinfection contemplated in this act. Whoever shall wilfully violate the rules of the State Board of Health, made in pursuance of this act, or the order, by its duly appointed inspector, made in obedience to such rules, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be liable to payment of a fine of one hundred dollars and costs of prosecution, or imprisonment in the county jail for a period not to exceed ninety days, or both such fine and imprisonment, in the discretion of the court.

Sec. 7. Upon the written request of the State Board of Health and the Governor, the Auditor General is hereby directed to draw his warrant on the State Treasurer from time to time for such sums of money as may be necessary to be used by the State Board of Health to carry into full effect all the provisions of this act, said warrant to be paid from any money in the State treasury to the credit of the general fund not otherwise appropriated.

This act is ordered to take immediate effect.

Approved April 26, 1893.

In October, 1893, the Rules [No. 198] "Michigan Inspection of Immigrants and Travelers" were revised and printed to the number of 500 copies. The revised edition is as follows:

# MICHIGAN INSPECTION OF IMMIGRANTS AND TRAVELERS.

Rules "Framed and Published" by the Michigan State Board of Health, Under Act 230, Laws of 1885, as Amended by Act 47, Laws of 1893.

[198.] (Revised Edition, September, 1893.)

The Michigan State Board of Health, having been informed, and believing that cholera, small-pox, typhus fever, diphtheria, and other dangerous communicable diseases exist in various foreign countries from which immigrants are coming to the United States in large numbers, and having reason to believe that many of these immigrants are likely to come into the State of Michigan, thereby imperiling the health and lives of the citizens, does hereby, as required by Act 230, Laws of 1885, as amended by Act 47, Laws of 1893, reëstablish the system of quarantine heretofore declared, and frame and publish the following revised rules relative to inspection, isolation, detention and disinfection, contemplated in said Act.

RULE 1. No railroad corporation, officer, employee, or person in charge of or connected with any railroad car, ferry, boat, or other public or private conveyance, shall bring or assist in bringing into this State any sick person, or any immigrant, or any baggage of any immigrant, or any other article liable to be infected, until such sick person, immigrant, baggage, or article liable to be infected shall have been examined by an inspector authorized to act for the Michigan State Board of Health under Act 230, Laws of 1885, as amended by Act 47, Laws of 1893, nor until such inspector shall have authorized the entry of such sick person, immigrant, baggage, or infected article; and no immigrant shall come into this State, or travel within the State, until inspected under these rules, and until authorized to do so by an inspector appointed or accredited by the Michigan State Board of Health.

Whoever shall wilfully violate one of these rules or an order relative to such person, baggage, or article, the order having been made by such an inspector under the above-mentioned act, is liable to the penalty specified in section six of the act referred to above, under which these rules are framed.

### DISINFECTION OF IMMIGRANTS' BAGGAGE.

RULE 2. Except as hereinafter specifically excepted, all baggage of all immigrants and all containers of all such baggage, destined to pass into or through Michigan, must be detained until disinfected, under the direction of an inspector authorized by the Michigan State Board of Health, by the following methods:—

For disinfection of clothing and other articles made of wool, cotton, linen or silk, employ one of the two following methods:

1. Boiling in water not less than one hour.
2. Exposure to steam not less than one hour, the steam to be not less than 212 degrees nor more than 239 degrees Fahrenheit.

Leather trunks, boxes or other containers of baggage, also wearing apparel of leather or fur, and other articles liable to be injured by boiling or by steam heat, must be opened, spread out, and exposed not less than three hours to sulphurous acid gas, made by burning not less than three pounds of roll sulphur to each one thousand cubic feet of space in the closed room in which the articles are exposed.

EXCEPTION 1. Baggage bearing a certificate issued by an inspector authorized or accredited by the Michigan State Board of Health (who may be stationed at a port where such baggage has been landed), that said inspector knows such baggage to have been disinfected in accordance with the rules of the Michigan State Board of Health, shall not be detained, except by reason of information obtained subsequent to the issuing of such certificate.

EXCEPTION 2. Immigrants' baggage contained in cars sealed, such seals not to be broken or the cars opened in the State of Michigan, shall not be detained.

EXCEPTION 3. Hand baggage of immigrants used *en route*, and known to have crossed the ocean in ships uninfected with any dangerous communicable disease, or bearing a certificate of disinfection, issued by an inspector authorized or accredited by the Michigan State Board of Health, as provided for in Exception 1, need not be disinfected, unless by reason of subsequent liability of infection.

EXCEPTION 4. (Adopted October 28, 1893.) Inspectors at the Michigan border are to accept and allow to pass all baggage bearing evidence from a properly-authorized Dominion or Provincial official, that it has been disinfected in accordance with the Rules of this Board, unless there is reason to believe that such baggage has been infected since leaving the Canadian point of disinfection.

### DISINFECTION OF PERSONS AND CLOTHES.

RULE 3. All immigrants and all persons known to have recently had cholera, or diarrheal or other sickness likely to have been cholera, and all persons, who, for any reason, are likely to harbor on their persons or wearing apparel the germs of cholera or other dangerous communicable disease, shall be required to have a thorough bath in warm water containing one drachm of corrosive sublimate to each five gallons of water, and to have his or her wearing apparel removed from the person and disinfected, by the methods above described.

### DUTIES OF INSPECTORS.

RULE 4. Every inspector of immigrants and travelers at the Michigan border duly appointed or recognized by the Michigan State Board of Health is required to order the detention of all immigrants seeking to enter the State of Michigan until such inspector shall learn and record the name, nationality, place of embarkation, destination, and apparent physical condition of each such immigrant.

RULE 5. When such inspector is convinced, from such inspection and otherwise, that any immigrant crossed the ocean in a ship uninfected with cholera, small-pox, typhus fever, diphtheria or any other dangerous communicable disease, and that such immigrant is free from every such disease, or the infection of such disease, and that all of his or her baggage has been disinfected in accordance with the rules of this Board, such immigrant shall be permitted to proceed without further delay; but should such immigrant be found to be sick with, or to have been exposed to any such dangerous communicable disease, and the period of incubation of such disease is not yet passed, or the infection likely to be still present in the person or clothing, or his or her baggage has not been disinfected in accordance with the rules of this Board, he or she shall not be allowed to enter the State or to travel from place to place within the State, until the facts have been telegraphed by such inspector to the Michigan State Board of Health, and permission has been granted by such Board for such immigrant to proceed. And in case any person or property is detained by an inspector, for any of the purposes mentioned in these rules, the party or parties interested shall have a right to a hearing before the said Board, on giving the Board a notice that such hearing is desired, the place and time of hearing to be determined by the Board on receiving such notice.

### COÖPERATION OF STATE AND NATIONAL, WITH LOCAL OFFICERS.

RULE 6. In order that no local law or requirement shall be evaded, each State Inspector should keep himself informed of the local laws, ordinances, and requirements of the local board of health; and before releasing from quarantine, under State rules or orders, immigrants, their baggage, or other persons or baggage, the inspector should be sure that no lawful local requirement is contravened, and, if there is danger of this, that the local health authorities have such timely notice that they may themselves either continue the quarantine safeguards, or notify a United States Inspector, whose instructions should require him, in accordance with Sec. 3, of the Act of Congress, approved Feb. 15, 1893, to "aid State and municipal boards of health in the execution and enforcement of the rules and regulations of such boards."

RULE 7. Dangerous communicable diseases being now present in every country from which immigrants are coming into Michigan, no immigrant, and no traveler or other person believed by the State Board of Health or by its authorized inspector to have been exposed to and liable to convey cholera, diphtheria or other dangerous communicable disease, shall pass through Michigan, or from one township, city or village to another within the State, without permission from the State Board of Health or its authorized inspector.

It is not the desire of this Board to detain immigrants or travelers unnecessarily, or to cause them any annoyance or inconvenience beyond what seems to it requisite to ensure the public safety. The rules it has adopted seem clearly necessary, and if intelligently enforced need cause but brief detention on the great mass of immigrants, and but little expense to lines of transportation.

The State Board expects intelligent, discreet, and honest service from its inspectors, as it may be largely through the effective and thorough work they may do, that the passage of immigrants into and through Michigan shall be rendered harmless to the citizens of Michigan.

Adopted by the Michigan State Board of Health, June 16, 1893, and amended September 30, 1893.

[OFFICIAL.]

ATTEST: FRANK WELLS, PRESIDENT.
HENRY B. BAKER, SECRETARY.

[Additional rules, under this same law, especially relating to internal quarantine, will probably be issued hereafter.]

At the meeting of the Michigan State Board of Health, at Lansing, September 30, 1893, the following resolution was unanimously adopted:

"*Resolved*, That it is the will of this Board that the President and Secretary continue to take such action as may be necessary to enforce the rules of this Board and to enforce quarantine at the Michigan border and within the State against diseases dangerous to the public health, and to compel any railroad company operating within the State to obey the State health laws, and the rules and regulations of the State Board of Health made under the law."

HENRY B. BAKER,
*Secretary.*

### SANITARY PUBLICATIONS DURING THE FISCAL YEAR 1894.

The two-page leaflet relative to the dangerous communicable diseases, in several different languages, was reprinted, from plates, to the number of 3,000 copies each, as follows:—In the French [No. 68], in Swedish [No. 70], in Danish-Norwegian [No. 69], and in Polish [No. 73].

The slip relative to consumption being a "Disease Dangerous to the Public Health" was reprinted several times during the year. In Oct. 1893, it was printed to the number of 5,000 copies, in January, 1894, 5,000 copies. And in June, 1894, to the number of 5,000 copies. [The slip is printed on page lxvii of this Report.]

In January, 1894, 2,000 copies of the diagrammatic leaflet "Chart I." and "Chart II.," showing the relation of typhoid fever to sewerage and water supply in cities of this and other countries, were reprinted for distribution.

In January, 1894, 15,000 copies of the pamphlet [No. 110.] "The Restriction and Prevention of Scarlet Fever" were reprinted for distribution.

In February, 1894, there were printed 2,000 copies of the two-page leaflet of diagrams "Lives Saved by Public Health Work," and "Isolation and Disinfection Restricted Scarlet Fever and Diphtheria in Michigan during the 5 years 1886-90." During this same month there were printed 2,000 copies of the two-page leaflet of diagrams "Deaths in Michigan, years 1876-87" on one side and "Pathogenic Microörganisms 'Germs' of Disease" on the other side; also 2,000 copies of the two-page leaflet of diagrams showing the results of "Isolation and Disinfection" in the restriction of scarlet fever in Michigan in 1890 and in 1891.

In May, 1894, there were printed 2,000 copies of the two-page leaflet diagram showing the introduction of sewers and water supply in Munich and a coincident reduction of typhoid fever, and showing also the relation of "Low Water in Wells" and the prevalence of Typhoid Fever. During the same months several other leaflet diagrams were printed: 2,000 copies of "Isolation and Disinfection Restricted Typhoid Fever in Michigan in 1890" and World's Fair Diagram No. 14 "Low Water in Wells and Sickness from Typhoid Fever in Michigan, 12 years, 1878 and 1880-90": 2,000 copies of "Isolation and Disinfection Restricted Scarlet Fever in Michigan in 1890" and "Isolation and Disinfection Restricted Scarlet Fever in Michigan in 1891"; 2,000 copies of "Deaths in Michigan, years, 1876-87" and "Pathogenic Microörganisms 'Germs' of Diseases"; and 2,000 copies of "Lives Saved by Public Health Work" and "Isolation and Disinfection Restricted Scarlet Fever and Diphtheria in Michigan during the 5 years, 1886-90."

During the month of May, 1894, a new circular [No. 211.], "Local Quarantine Regulations," was printed to the number of 2,500 copies. The circular is printed here, as follows:—

# LOCAL QUARANTINE REGULATIONS.

CIRCULAR ISSUED BY THE MICHIGAN STATE BOARD OF HEALTH, MAY, 1894.

[211.]

*To the Presidents of Local Boards of Health and Local Health Officers at Ports on the Great Lakes or other Navigable Waters in Michigan:—*

GENTLEMEN—The danger from small-pox is now imminent. Recently a meeting of delegates of State Boards of Health of States around Chicago, was held in Chicago because of the continued epidemic of small-pox in that city, and one resolution adopted was as follows:

> "*Resolved*, That no vessel plying on the lakes should be allowed to enter any port within the boundaries of our respective States without having on board subject to inspection, a bill of health, duly signed by an officer of the United States Marine Hospital Service."*

Sections 1659–66 inclusive of Howell's Statutes (sections 71-78 of my compilation of the Public Health laws) give local boards of health powers of control over quarantine, but only after the local board shall have made and *published* regulations. There is now unusual danger from small-pox. Any day it may be brought to any port in Michigan, and if no regulations have been made and published the local board of health may be powerless to control the movements of the vessel, its officers or crew. Therefore it is important that every local board of health whose jurisdiction borders upon one of the great lakes or upon one of the "principal rivers or straits connecting together any of said lakes or bordering upon any navigable waters uniting with any of the said rivers, or straits," shall make and publish regulations relative to quarantine.

In framing regulations it will probably be well for your local board of health to have the advice of the official attorney of the city or village, the prosecuting attorney of the county or some other capable attorney.

Other sections of law than those mentioned above should be consulted, especially sections 1636, 1639-55 and 1659 of Howell's Statutes.

Publication of the regulations is necessary in accordance with Howell's, § 1639.

The nature of the regulations may not need to be the same at every port, but they should all be sufficiently general to be applicable to any conditions liable to occur. One regulation may be somewhat as follows:

> "No vessel from Chicago or any other port near which small-pox or other dangerous communicable disease is epidemic, shall be permitted to [enter this port?] land a passenger or discharge baggage or freight within the jurisdiction of this board of health, except [by special permission of the health officer of this jurisdiction?] in accordance with regulations hereinafter specified."

Another regulation may specify the duties of the health officer under the foregoing regulation, including reference to the bill of health required of each vessel.*

One regulation should require that

> "Except by permission of the health officer or other special officer of the local board of health in charge of such hospital, no person shall enter or depart from and no article shall be removed from any isolation hospital, residence, vessel, or other place in which any person sick or infected with a dangerous communicable disease has been ordered to remain by the local health officer or the local board of health."

One regulation may be as follows:—

> "No person sick with diphtheria, scarlet fever (scarlatina, scarlet rash, rash fever), small-pox, or any other dangerous communicable disease; no corpse of a person dead from one of the above-named diseases, or from any other dangerous communicable disease; no person who has lately had any such disease, and no article which has been infected or is liable to propagate or convey any such disease, shall be moved about, removed therefrom, or be brought within this [township, city, or village, as the case may be] or go or be carried out of this [township, city, or village] without the special permit and direction of the health officer or the board of health thereof.
>
> "The foregoing regulations shall remain in force until revoked by the board of health of this [township, city, or village].

---

*The U. S. Marine Hospital Service has a steam vessel with officer and assistants to board each vessel as it leaves the river at Chicago so that any vessel entitled to it can there easily obtain a "Bill of Health" and can also have its officers and crew vaccinated.

"Whoever violates the foregoing regulations incurs the penalty of the law.

"Permits for the removal of infected persons or articles, in accordance with law, may be granted by this board, and, when the board is not in session, by the health officer, under circumstances and conditions as recommended by the State Board of Health.

"Signed,

———— ————,

———— ————,

"*Members of the Board of Health of the* [*township, city, or village of* ----]."

In case a vessel with infection of a dangerous disease on board, arrives within your jurisdiction before your board has published regulations, a meeting of the board should immediately be held, regulations should be made, and published at once. No length of time of publication is specified in the law.

### ISOLATION HOSPITAL.

In case small-pox or other dangerous communicable disease is brought to your jurisdiction, it will be necessary to have a hospital in which to isolate infected persons. Sections 1647-8 and 1667-74 of Howell's Statutes relate to this subject.

The proper management of such isolation hospital requires that regulations shall have been made by the local board of health, under sections 1635-6; and all such regulations must have been published under section 1639, Howell's Statutes.

Regulations relative to any isolation hospital or hospitals which may be established in your jurisdiction should be made *now* and published. On the occurrence of small-pox or other dangerous communicable disease the chances are that a special hospital will be necessary. This seems to be imperatively required by § 1671 Howell's Statutes. But even if a case is isolated in the residence where it occurs, that residence must then be treated (under Howell's § 1672) as an isolation hospital, and regulations which will be applicable to such cases should be made now and published.

### NOTICES TO THE STATE BOARD OF HEALTH.

In case a dangerous communicable disease such as small-pox, scarlet fever, or diphtheria, occurs on board a vessel, information should be promptly given the Secretary of the State Board of Health; of the place from which the vessel came, and the place to which the vessel is or was going, the places at which the vessel has recently stopped, the places at which the vessel will probably stop after leaving your port, where the vessel is at the time you telegraph, and where the vessel is likely to be for the next 12 or 15 hours; also the name of the disease, and of the person sick or infected, and the final destination of such person. This information is important, in order to enable this State office to aid other localities in preventing the introduction and spread of a dangerous disease.

Any aid which the office of the State Board of Health can give your locality will be cheerfully rendered.

By direction of the State Board of Health.

HENRY B. BAKER,
*Secretary.*

OFFICE OF THE SECRETARY, STATE BOARD OF HEALTH,
*Lansing, May 19, 1894.*

In May, 1894, the two-page leaflet on "Now is a good time to be Vaccinated" was revised somewhat and printed to the number of 5,000 copies, for general distribution through the State.

In June, 1894, the pamphlet on "The Restriction and Prevention of Consumption" [No. 175] was reprinted to the number of 10,000 copies,

The circular "blue-letter" [162], relative to Typhoid Fever was amended considerably and 1,000 copies were printed. The amended edition reads as follows:—

MICHIGAN STATE BOARD OF HEALTH,
OFFICE OF THE SECRETARY,
*Lansing, Michigan,*..............189..

[162.]

..........................................................,
*Health Officer of*..........................................,
.........................................................

DEAR SIR:—I am informed that Typhoid Fever is present in your jurisdiction. By mail I send you one copy of a pamphlet [120] which gives an outline of the duties of the Health Officer and of the Local Board of Health. I also send you——copies of a document [124] issued by this State Board of Health relative to the prevention of typhoid fever. I trust you will distribute the documents sent to you where they will do the most good; and it is believed that if distributed to the family and to the neighbors of the family in which this disease is, the documents will be most likely to be read with interest and profit.

It is of importance that prompt, thorough, and persistent measures be employed for the restriction of the disease. Act No. 137, Laws of 1883 (printed on page three of our pamphlet No. 120, on "Work of Health Officers"), requires the health officer to act promptly, even if his Board takes no action. Directions for disinfection are given in detail in each copy of the document relating to this disease, sent to you.

In order to make the measures recommended most effectual, it is necessary to secure, either from the householder or the physician, prompt notice of each case of this disease. By proper effort it is believed that these notices may be secured under the law as set forth in §§ 1675, 1676, 1684, 8439, 8440 and 8442 of Howell's Annotated Statutes. §§ 1675 and 1676 of Howell's Statutes were modified by Act No. 11, Laws of 1883. § 1675 of Howell's Statutes was again amended by Act 37, Laws of 1889.

I trust you and your Board of Health will do all that is possible to restrict this disease. Your action should be prompt, efficient and persistent. Any aid which this office may be able to give you will be cheerfully rendered.

*After the outbreak is over*, I would be pleased to receive from you a final report of this outbreak (for which a blank will be sent to you later), which report, in order to be of the greatest use in giving knowledge of the modes of spreading this disease and of the best methods for its restriction and prevention, should be exact and explicit; then abstracts of replies from localities where this disease occurs will, when combined, give valuable knowledge which may be published for general use in the Annual Reports of this Board. This being one object in view, your replies to the questions are urgently solicited. The answers to the questions in the blank for final reports are important for the purpose of acquiring a correct knowledge of how typhoid fever is spread; and it is suggested that while the health officer is on the premises where the first case occurred, that he make a memorandum of the circumstances, as he will then be able to question members of the family relative to such answers as he himself cannot supply. The questions in the final report, to which replies will be asked, are printed on the back of this sheet.

A blank form with a stamped envelope, will be sent for your final report. A final report is desired even if there has been only one case in your jurisdiction.

*Please make special weekly reports, on blanks which I send you by this mail, so long as the disease lasts.*

By direction of the State Board of Health.

Very respectfully,
HENRY B. BAKER, *Secretary.*

## INVESTIGATION OF AN OUTBREAK OF TYPHOID FEVER.

### QUESTIONS WHICH SHOULD BE ANSWERED IN THE FINAL REPORT.

1. What was the disease called by the attending physician?*
2. In what township, village, or city did each of the cases occur?
3. How was the disease introduced into your jurisdiction?
4. What was the origin of the disease?

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* Typhoid fever, typho-malarial fever, continued fever, etc., as the case may be.

5. If any beside the first case were sick, how did they contract the disease?

6. When was the first case taken sick, and when did the last case die, or recover?

7. At the beginning of this outbreak in how many households was this disease?

8. At the close of this outbreak in how many households has this disease been?

9. How many cases were there in this outbreak, and how many died?

10. Previous to being taken sick, what was the ordinary source of drinking water of the first person taken sick in this outbreak?

11. If from a well, how many privies are within one hundred feet of this well?

12. Has there been any sickness from *any fever* during the last twelve months in any of the persons using one of these privies? If so, what was the fever?

13. How much more or less than the usual depth of water was there in the well just previous to, or at the time of, the beginning of this outbreak?

14. Was water from some other source drank about seven to fourteen days previous to beginning of sickness?

15. When (how many months or years ago) was there a case of typhoid fever on the premises where the first case of this outbreak occurred?

16. In this outbreak, were all of the bowel discharges, of all the sick, disinfected before being removed from the house? For which patient was this done? On what day of the sickness was it begun? How much of what disinfectant was used for each discharge?

17. What was done with the bowel discharges from each of the patients?

18. How much of what disinfectant was used in the privy vault used by the patient? About how many cubic feet of excreta are now in the privy vault?

19. Was the clothing or bedding which was soiled by the discharges of the patient thoroughly disinfected? For which of the patients was this done?

20. Was the room which the patient occupied while sick, together with its contents, disinfected with burning sulphur? If so, how much sulphur was burned? How much was this per thousand cubic feet of air space? For which of the patients was this done?

21. Was everything which came in contact with a sick person destroyed by fire, or disinfected thoroughly? How?

22. Was the water from the wells on or near the infected premises boiled before being drank? If so, when was the use of boiled water commenced? How long continued?

23. What else was done to restrict the spread and prevent the reappearance of the disease?

24. After the first person was taken sick what exceptions were there to the complete accomplishment of the foregoing measures,—disinfection of excreta, boiling of water drank, etc.?

25. In this outbreak, how many of the cases can you trace to a previous case?

26. What are the evidences of success of the efforts at restriction?

27. What facts bear on the subject of the period of incubation?

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June 11, 1894, copies of a new form for salary vouchers for the use of the office were printed, as follows:—

$------

Received of the Auditor General a warrant upon the Treasurer of the State of Michigan for the sum of -------- dollars and -------- cents, to apply on salary.

Lansing, -------- 189--.

I hereby certify that the above amount is due.

----------------------------------------------

--- -----------------------------------------,

*Secretary State Board of Health.*

No. ------.

SALARY VOUCHER.

$-------.

Salaries -------- R. T. $-------.

To apply on salary as -------- in the office of the State Board of Health for month of --------, 189--

Audited --------, 189--.

----------------------------------------,

*Auditor General.*

### SECOND ANNUAL CONFERENCE OF MICHIGAN HEALTH OFFICERS, AT ANN ARBOR, JUNE 14 AND 15, 1894.

The Second Annual Conference of Michigan Health Officers was held at the State Laboratory of Hygiene, Ann Arbor, Michigan, June 14 and 15, 1894, for the presentation of facts and the general comparison of views by health officers and other delegates of local boards of health among themselves and with the members of the State Board and others, with especial reference to the three important preventable diseases, namely —Consumption, Typhoid fever, and Small-pox. Besides a large number of health officers and delegates from local boards of health in Michigan, there were present representatives of other State Boards of Health, and the Health Commissioner of Chicago. Numerous valuable addresses were made, and the discussions were especially interesting and important. The proceedings of the meeting were printed in pamphlet form [Reprint No. 417].

### INSTRUCTIONS TO NEWLY-APPOINTED HEALTH OFFICERS.

As fast as the names and addresses of health officers for 1894-95 were received, a copy of the pamphlet [120] detailing the duties of health officers was sent to each, together with blanks "L" for the prompt report of dangerous communicable diseases, and sample copies of the pamphlets on the restriction and prevention of diphtheria, scarlet fever, typhoid fever, measles, consumption and small-pox, a pamphlet reprint on the "Restriction and Prevention of the Dangerous Communicable Diseases" and a copy of each of two two-page leaflet diagrams, one exhibiting the experience in restricting diphtheria in 1889–90, and one exhibiting the experience in restricting scarlet fever in 1890–91, and in some instances a copy of the pamphlet containing the laws relating to public health in force in Michigan in 1890.

### HEALTH BULLETINS, WEEKLY, MONTHLY, AND QUARTERLY.

The weekly reports of diseases received up to Wednesday of the week following the week for which they are made, are compiled on that day, week by week, and a bulletin, based on that compilation, is sent for publication to a number of newspapers, and to sanitary and medical journals. A telegraphic abstract from the compilation is also sent weekly to a Michigan Press Association. A specimen of this weekly bulletin can be found on page xii of the Report for 1884; and a later specimen of the weekly bulletin can be found printed here, as follows:—

## HEALTH IN MICHIGAN.

Reports to the State Board of Health, Lansing, by observers in different parts of the State, show the diseases which caused most sickness in Michigan during the week ending June 30, 1894, as follows:—

| Number of regular observers heard from 50. | | For preceding week. |
|---|---|---|
| Diseases arranged in order of greatest area of prevalence. | Per cent of observers who reported the disease present. | Per cent of observers who reported the disease present. |
| Rheumatism | 68 | 60 |
| Neuralgia | 50 | 59 |
| Diarrhea | 42 | 41 |
| Intermittent fever | 32 | 25 |
| Consumption, pulmonary | 32 | 82 |
| Tonsillitis | 30 | 29 |
| Bronchitis | 28 | 41 |
| Inflammation of kidney | 26 | 34 |
| Cholera morbus | 22 | 21 |
| Influenza | 20 | 16 |
| Remittent fever | 20 | 22 |
| Whooping-cough | 18 | 19 |
| Inflammation of bowels | 16 | 16 |
| Scarlet fever | 14 | 18 |
| Pleuritis | 12 | 12 |
| Diphtheria | 12 | 9 |
| Cholera infantum | 12 | 7 |
| Erysipelas | 12 | 15 |
| Measles | 10 | 13 |
| Inflammation of brain | 8 | 4 |
| Dysentery | 6 | 10 |
| Typhoid fever (enteric) | 6 | 4 |
| Pneumonia | 6 | 18 |
| Cerebro-spinal meningitis | 4 | 1 |
| Typho-malarial fever | 4 | 4 |
| Membranous croup | 2 | 3 |
| Small-pox | 2 | 4 |
| Puerperal fever | 0 | 4 |

For the week ending June 30, 1894, the postal-card reports indicate that influenza and intermittent fever increased, and that bronchitis decreased in area of prevalence.

At the State Capitol, for the week ending June 30, 1894, compared with the preceding week, the prevailing direction of the wind was the same (south-west), the velocity was 2.1 miles per hour greater; the temperature was 2.15 degrees higher; the rainfall was .25 of an inch more; the absolute humidity was more, the relative humidity was slightly less; the day and the night ozone were less.

Including reports by regular observers and others, *consumption* was reported present during the week ending June 30, and since at *two hundred* and *twenty* places; *scarlet fever* at *forty-two* places—Allen Tp., Bangor, Bessemer, Benton Harbor, Butler Tp., Carmel Tp., Concord Tp., Calumet Tp., Clarendon Tp., Cumming Tp., Detroit, Duncan Tp., Flint, Fulton Tp, Grand Rapids, Greenville, Harrison Tp., Houghton, Ingersoll Tp., Kalamazoo, Lebanon Tp., Muskegon, Menominee, Midland, North Muskegon, Otisco Tp., Ovid, Onondaga Tp., Owosso, Petoskey, Pontiac, Plainfield Tp., Porter Tp., Salem Tp., Saginaw, St. Clair, S Johns, Sturgis, South Frankfort, Sidney Tp., Walton Tp., and Ypsilanti; *measles* at *thirty-two* places Albert Tp., Big Rapids, Bloomingdale, Bloomingdale Tp., Chester Tp., Clifford, Concord, Concord Tp., Casco Tp., Dewitt Tp., Grand Rapids, Groveland Tp., Ionia, Interior Tp., Kimball Tp., Ludington, Manchester Tp., Mendon, Manistee, Muskegon, Middleville, Norvell Tp., Parma, Plymouth, Plainfield Tp., Pentwater, Saranac, Spring Arbor Tp., Sebewaing, Vermontville, Wales Tp., and Yale; *diphtheria* at *twenty-three* places—Allen Tp., Alpena, Aurelius Tp., Bay City, Calumet Tp., Cheboygan, Chester Tp., Detroit, Grand Rapids, Kalamazoo, Koylton Tp., Menominee, Monroe, Paris Tp., Solon Tp., Scotville, Saginaw, Sherman Tp., St. Johns, St. Louis, Talmos Tp., Vermontville Tp., and Wixson Tp.; *typhoid fever* at *twenty-one* places—Albion, Bessemer, Calumet Tp., Casco Tp., Croswell, Conway Tp., Carsonville, Grand Rapids, Kalamazoo, Kenockee Tp., Mackinaw City, Menominee, Marine City, Monroe, Owosso, Richland, Richland Tp., Saginaw, St. Johns, Thetford Tp., and Wales Tp.; *small-pox* at *ten* places—Berlin Tp., Bay City, Detroit, Frenchtown Tp., Farmington Tp., Grand Rapids, Macomb Tp., Pontiac, Sturgis, and Ypsilanti; *one* case of suspected *typhus fever* at Gobleville.

HENRY B. BAKER,
*Secretary.*

*Lansing, Michigan, July 3, 1894.*

This subject of dissemination of information by means of bulletins is treated of in the article on "Time of Greatest Prevalence of each Disease," on page 84 Annual Report of this Board for 1893.

Beginning with the month of August, 1884, a *monthly* health bulletin has been issued immediately after the close of each month, for the use of sanitary and medical journals. Beginning with the bulletin for the month of September, 1889, a third column was added, being the average for the bulletin month in the preceding series of years, beginning with the year 1886. This enables the reader to make a comparison of the prevalence of each disease in the last preceding month with the same disease in the corresponding month in the preceding series of years. An example of this form of bulletin was printed on pages xlv-xlvi. of the Report for 1890; and the bulletin for the month of May, 1894, is printed here, pages xcii–xciii.

At the close of each quarter these monthly bulletins are consolidated for the Secretary's "Quarterly Report of Work in the Office," comparing the communicable diseases this quarter with the preceding quarter to learn their increase or decrease; including also the meteorological conditions and the sickness from all causes compared with the preceding quarter, and with the average for corresponding quarters for the series of years beginning with 1886.

## DIAGRAMS OF INSTRUCTIVE EXPERIENCE IN MICHIGAN.

Two two-page leaflet diagrams, "Isolation and Disinfection Restrict Diphtheria," and "Isolation and Disinfection Restrict Scarlet Fever," have been printed and many hundreds of them distributed as heretofore mentioned. They exhibit, in a condensed form, the experience of the health officers in Michigan, with these two important diseases, in each of the years 1890 and 1891. The evidence in them is similar to that in similar diagrams which have been published for other years; therefore the evidence gains greatly in strength.

### ABSTRACTS OF PROCEEDINGS OF MEETINGS OF THE STATE BOARD.

Abstracts and brief accounts of the proceedings at meetings of the State Board of Health are prepared, printed and distributed soon after the regular meetings of the Board. (Extracts from these abstracts are printed on preceding pages of this Report.) The distribution of the pamphlet Proceedings is not the same for all meetings, being to different classes of persons, according to the nature of the contents, in some instances being sent to teachers and school officers, in other instances to health officers, etc.

### SECRETARY'S QUARTERLY REPORTS OF WORK IN THE OFFICE.

At the close of each quarter the Secretary prepares a brief report of work done in the Office. This report is presented and generally read at the next regular or special meeting; and, if the abstract of proceedings of the meeting is printed, the report is printed in the pamphlet.

### REPRINTS.

Reprints, of articles in the Report and in Proceedings of Sanitary Conventions, have been made in pamphlet form, and sent in answer to queries, in letters, that can best be answered in that manner. For example, many reprints of the article relative to alleged nuisances in the preceding year, have been thus sent out, in response to questions.

## HEALTH IN MICHIGAN, MAY, 1894.

Reports to the State Board of Health, Lansing, by observers in different parts of the State, show the diseases which caused the most sickness in Michigan during the month of May (5 weeks ending June 2), 1894, as follows:—

| | Number of reports received for this month 353. | Per cent of reports stating presence of disease. | | |
|---|---|---|---|---|
| | Diseases arranged in order of greatest prevalence in this month. | May 1894. | April 1894. | Av. for May, 8 years, 1886–93. |
| 1 | Rheumatism | 69 | 70 | 72 |
| 2 | Neuralgia | 58 | 62 | 65 |
| 3 | Bronchitis | 51 | 58 | 58 |
| 4 | Tonsillitis | 46 | 51 | 49 |
| 5 | Consumption, pulmonary | 40 | 42 | 57 |
| 6 | Influenza | 39 | 58 | 41 |
| 7 | Diarrhea | 27 | 23 | 30 |
| 8 | Pneumonia | 27 | 29 | 29 |
| 9 | Intermittent fever | 25 | 22 | 41 |
| 10 | Inflammation of kidney | 24 | 20 | 22 |
| 11 | Measles | 22 | 19 | 21 |
| 12 | Erysipelas | 18 | 15 | 24 |
| 13 | Scarlet fever | 16 | 18 | 12 |
| 14 | Inflammation of bowels | 15 | 14 | 14 |
| 15 | Remittent fever | 14 | 16 | 25 |
| 16 | Pleuritis | 14 | 20 | 20 |
| 17 | Whooping-cough | 10 | 11 | 13 |
| 18 | Diphtheria | 8 | 5 | 8 |
| 19 | Cholera morbus | 7 | 6 | 6 |
| 20 | Typhoid fever (enteric) | 7 | 2 | 3 |
| 21 | Dysentery | 5 | 3 | 7 |
| 22 | Inflammation of brain | 4 | 6 | 5 |
| 23 | Cholera infantum | 4 | 4 | 3 |
| 24 | Membranous croup | 4 | 2 | 8 |
| 25 | Puerperal fever | 2 | 2 | 5 |
| 26 | Cerebro-spinal meningitis | 1 | 4 | 4 |
| 27 | Typho-malarial fever | 1 | 1 | 6 |
| 28 | Small-pox | 1 | 1 | 0.1 |

For the month of May, 1894, compared with the preceding month, the prevailing direction of the wind was northwest (instead of northeast), the velocity was slightly greater; the temperature was 8.48 degrees higher, the rainfall at Lansing was 3.21 inches more; the absolute and relative humidity and the day and night ozone, were much more and the depth of water in the well at Lansing was two inches more.

For the month of May, 1894, compared with the preceding month, influenza and pleuritis decreased in area of prevalence.

Compared with the average for corresponding months in the eight years, 1886–1893, the prevailing direction of the wind was north-west (instead of south-west), the velocity was one mile per hour greater; the temperature was slightly lower; the rainfall at Lansing was 2.62 inches more; the absolute and relative humidity were more; the day ozone was less, the night ozone was more, and the depth of water in the well at Lansing was two inches less in May, 1894.

Compared with the average for corresponding months in the eight years, 1886–1893, scarlet fever was more prevalent, and remittent fever, intermittent fever and pleuritis were less prevalent in May, 1894.

Including reports by regular observers and others, *consumption* was reported present in Michigan in the month of May, 1894, at *two hundred* and *twenty* places; *measles* at *one hundred* and *thirty* places; *scarlet fever* at *one hundred* and *eight* places; *diphtheria* at *seventy-two* places; *typhoid fever* at *thirty* places, and *small-pox* at *seven* places.

Reports from all sources show *consumption*, reported at the same number of places as in the preceding month; *measles at fifty-five* places more; *diphtheria* at *eleven* places more; *scarlet fever* at *ten* places more; *typhoid fever* at *two* places less and *small-pox* at *one* place more in the month of May, 1894, than in the preceding month.

HENRY B. BAKER,
*Secretary.*

*Lansing, Michigan, June 7, 1894.*

## MICHIGAN-CANADIAN INSPECTION OF IMMIGRANTS.

The "Michigan-Canadian Inspection of Immigrants" which was inaugurated by order of the State Board of Health, Sept. 6, 1892, and was discontinued January 13, 1894, was probably the most complete and satisfactory inspection system the Board has ever maintained. There were many points of interest during the period of its existence. Facts concerning the reasons leading up to the establishment of the system will be found in the "First Part" of the Annual Report of this Board for 1892; other facts relative to the maintenance and discontinuance of the system will be found in the "First Part" of the Report for 1893, and in the "First Part" of this Report. The Board framed and published Rules governing the Inspection of Immigrants and the disinfection of immigrants' baggage. A copy of the first published rules is printed on pages lxxix-lxxxii of the Annual Report for 1893. These rules were afterwards revised a second and third time. The second revision is printed on pages lxxxiii-lxxxv, of the Annual Report for 1893; and the third revision is printed on pages lxxix–lxxxii of this Report.

The following court decisions and special report by the Secretary, are only a few of the items of interest; in connection with the following, one should refer to the Proceedings of meetings, etc., on preceding pages of this Report.

### MINNEAPOLIS, ST. PAUL AND SOO R. R. VS. STATE BOARD OF HEALTH.

About July 6 an order was served on each member of this State Board of Health to appear at Marquette, July 15, to show cause why a preliminary injunction should not issue to stop the inspection of immigrants and travelers under the rules of the Michigan State Board of Health. Accordingly the Attorney General of Michigan, and the President and Secretary of the State Board of Health, went to Marquette, to appear before Judge H. F. Severens, United States Circuit Judge of the Northern Division of the Western District of Michigan. On account of the importance of the case Judge Severens had asked U. S. Circuit Judge George R. Sage, of Cincinnati, to sit with him.

In a few days the finding of the U. S. Judges was handed down, and a copy was sent to the office of the Secretary of the State Board of Health, and is as follows:

## CIRCUIT COURT OF THE UNITED STATES, WESTERN DISTRICT OF MICHIGAN—NORTHERN DIVISION.

MINNEAPOLIS, ST. PAUL & S. STE. MARIE RAILWAY COMPANY,
vs.
SAMUEL G. MILNER, ET AL., MEMBERS OF AND CONSTITUTING THE STATE BOARD OF HEALTH OF MICHIGAN.

*On motion for a preliminary injunction. Before Judges Severens and Sage.*

The bill sets forth that the complainant, a corporation of the State of Michigan, is and has been for several years past, engaged, under a traffic arrangement with the Canadian Pacific Railway Company, in the transportation of passengers, on through tickets from Quebec westward through Canada and over the line of the complainant's railway to and through the States of Michigan, Wisconsin, Minnesota and North Dakota, also eastward from those States, through Canada to Quebec, a large portion of the passengers westward being persons traveling from Norway and Sweden to points in said States.

The defendants, it is averred, constitute the State Board of Health of Michigan, acting under an act passed by the legislature of said State and approved June 20, 1885, entitled "An act to provide for the prevention of the introduction and spread of cholera and other 'dangerous communicable diseases'" as amended by an Act approved April 25, 1893. The bill has attached to it as exhibits a copy of such of said acts, and of certain rules adopted by said Board, purported to be issued under and by virtue of the authority conferred by said amendatory Act. It is further averred that said Board acting through its Secretary and one of its inspectors and in pursuance of said rules, is daily detaining and attempting to detain passengers on said Canadian Pacific Railway at the point opposite Sault Ste. Marie, Michigan, and prohibiting their entering the State of Michigan until they have undergone the quarantine detention and until the disinfection of their baggage as prescribed in said rules. It is averred that this detention, examination and process of disinfection of baggage is applied to all emigrants irrespective of whether they came from an infected or healthy locality abroad and without regard to their point of destination. It is further averred that all said emigrants and travelers have been, before said detention, inspected by United States officials detailed for said purpose and that complainant has not received nor permitted to be conveyed within the State of Michigan any passenger, traveler or emigrant coming from any European port through the Dominion of Canada, excepting such as have presented a certificate of inspection of the United States inspector. It is also averred that said Board is threatening to arrest officials and employés of complainant unless complainant shall submit to and comply with said requirements of said Board.

The claim is that the rules and action of said Board of Health are in direct violation of Section 8, Article 1, of the Constitution of the United States, in that they attempt to regulate and prohibit commerce with foreign Nations; and that they are also in violation of the treaty made by and between the United States and Norway and Sweden and now existing; also that they are over, above and beyond the powers conferred upon said Board by said Act and Amendatory act of the Legislature of Michigan. The bill then sets forth averments of irreparable damages and prays for an injunction.

The motion for a preliminary injunction will be overruled for the following reasons:

1. In Brown *vs.* Maryland, 12 Wheaton 419-433, Chief Justice Marshall recognized that the removal or destruction of infectious or unsound articles was undoubtedly an exercise of the police power of the State, and an exception to the prohibition resulting from the exclusive power of Congress to regulate the operations of foreign and interstate commerce, and he says that "Laws of the United States expressly sanction the Health laws of the State." In the license cases 5 Howard, 504, 576, Chief Justice Taney declares that " It must be remembered that disease pestilence and pauperism are not subjects of commerce, although sometimes among the attendant evils. They are not things to be regulated and trafficked in, but to be prevented as far as human foresight or human means can guard against them." In Ceatcher *vs.* Kentucky, 141 U. S. 47, Justice Bradley refers to these cases with approval, and states with great clearness and

force the distinction between the exercise of its police power by a State and an attempt to legislate upon matters of interstate or foreign commerce, which are exclusively within the power of the Federal Government. These authorities render it unnecessary to refer particularly to the cases cited for the complainant. It is sufficient to say that they all relate to State enactments concerning articles of commerce and thence are not applicable here. Moreover the Quarantine Act of Congress, approved February 15, 1893, expressly recognizes the validity of State laws, and in Section 3 requires the Supervising Surgeon General of the Marine Hospital Service to coöperate with and aid State and Municipal Boards of Health in the execution and enforcement of their rules and regulations.

2. We find nothing in any existing treaty with Norway and Sweden which conflicts with the institution or enforcement by any one or more of the States of this Union of quarantine regulations.

3. We do not deem it necessary to express an opinion whether the provision of the Michigan Statute making it a misdemeanor to violate the rules of the State Board of Health adopted in pursuance of the Act, is constitutional or valid, for we should not, even if we were of opinion that it is unconstitutional undertake to issue an injunction against Criminal Prosecution by the State. That the Legislature might authorize the Board to adopt rules is, we think, beyond question. Such rules are essential to the proper enforcement of the law.

4. To the objection that passengers from non-infected countries and localities are detained, the answer is that such detentions are in the nature of the case, to a certain extent unavoidable; and passengers from such countries and localities may have become properly subject to detention by reason of having mingled with others who could communicate pestilence or disease to which they themselves had been exposed or subjected. An opportunity for separation is indispensible also.

5. The objection that passengers who had certificates from United States inspectors, were detained, is not tenable. The States may exercise their police power according to their own discretion and by means of their own officials and methods. The inconvenience resulting to emigrants and travelers from being halted and subjected to examination and detention at State lines is of trifling importance, at a time when every effort is required and is being put forth to prevent the introduction and spread of pestilential and communicable diseases.

The costs and charges which are incurred in such quarantine inspection may lawfully be imposed on the Railway Co. as being incident to the business in which they are engaged. The costs of the motion will be taxed to the complainant.

July 29th, 1893.

H. F. Severens.
Geo. R. Sage.

## CONGRATULATORY LETTERS RELATIVE TO THE U. S. COURT DECISION.

Copies of the foregoing decision were sent to Secretaries of State Boards of Health, railroad authorities, and others interested in public health subjects, and especially in this case. Letters of congratulation have been received by the Secretary of the Board, and extracts from a few of them are as follows:

Dr. J. H. Hamilton, Secretary of the Vermont State Board of Health, writes: "Will you allow me to congratulate you on the important decision you obtained, not only for your Board and that of other States, but for the people at large. I shall make use of this decision in my report soon to be published."

E. B. Frazer, M. D., Secretary of the Delaware State Board of Health, says: "Your Board *won of course.* Railroad companies want dollars—care nothing about the spread of diseases and the loss of life. I will be pleased to hear from you further on the subject. As a rule our State courts uphold State Boards of Health, and this is as it should be."

N. D. Baker, M. D., Secretary of the West Virginia State Board of Health, says: "You have conferred a public benefit of far-reaching consequences in thus securing so unequivocal a statement of the rights and powers of the health authorities of the States."

It is undoubtedly understood that all that was done by the State Board of Health was to prepare a statement of facts bearing upon the subject. Some of these facts are very interesting, and not generally known. They may be published later.

### SECRETARY'S REPORT RELATIVE TO IMMIGRANT INSPECTION AT THE STATE LINE.*

The first item in this report may cause surprise, but I think it must be apparent to every member of this Board, and to every person who has examined or shall examine the subject, that in the execution of the present quarantine law, its enforcement is a flat failure. My belief is that this is not due to the several officials, nor to any one of the officers charged with the execution of the law. The Governor has expressed himself as desirous that this Board should be sure that its course was right, and then that the law be carried out. The Attorney General has cheerfully acted and advised whenever called upon. The prosecuting attorney of Chippewa county, the only county in which the law has been disregarded, has zealously endeavored to enforce the law. The justice of the peace at Sault Ste. Marie who was applied to to aid in the enforcement of the law, faithfully performed his duty. Each one of the several inspectors who have been appointed by this Board has labored to the best of his ability to fulfill the law. For all ordinary purposes the State law makes the Secretary of this Board the Executive officer of the Board. But the quarantine service was of such importance to the people of Michigan, that this Board appointed a special committee to execute its rules. That committee consists of the President and Secretary of the Board. I believe no one doubts that this committee has labored diligently, incessantly and faithfully to carry out the rules of the Board, and its resolutions requiring the enforcement of the law. Notwithstanding all these efforts, extending through several months, the law is still being disregarded by at least one comparatively insignificant railroad whose main business appears to be the bringing in of immigrants from dangerously infected countries. And, further, the disinfection of baggage is not completely done at that port (the "Soo") and there is no immediate prospect that it will be done, unless some new method is adopted for executing the law. I have several times suggested that there should be an effort to force the execution of the law pending any question which may be raised as to its constitutionality; I have asked the Attorney General if the Circuit Judge, under "Circuit Court Rule 107" adopted by the Supreme Court May 31, 1893†, cannot issue a mandamus requiring the railroad companies at the "Soo" to obey the State law, pending the settlement of any question of its constitutionality, or to show cause why they should not obey the law. I here repeat this suggestion. Unless some such action can be taken, it seems to me that we should all admit that, so far as the enforcement of the law is concerned, it might as well be abandoned.

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* This report was read by the Secretary, and discussed by the Board at meeting Oct. 27 and 28, 1893, pages xxiii-xxvii of this Report.

† CIRCUIT COURT RULE 107. Circuit courts shall have jurisdiction, within their respective counties, in all mandamus proceedings, involving the action of any officer or board of any county, township, city or school district, or of the common council of any city or village, and the action of *any private corporation or officer or board thereof*. Said Circuit Courts shall also have jurisdiction to issue writs of certiorari in all cases where they may now be issued by the Supreme Court to Probate Courts, Circuit Court Commissioners and Justices of the Peace, or any corporate body or officer thereof. Writs of certiorari and orders to show cause in cases of mandamus, shall be made returnable and service thereof made within such time as the Circuit Courts shall upon each application direct.

*Adopted May 31, 1893.*

The penal section of the law is wrong in principle, or at least it is incomplete, and apparently worse than none. Those of you who were present a few days ago at the International Congress of Hygiene in Chicago, and heard the address by Mr. Bonney, the President of the World's Congress Auxiliary, remember how he laid down the principles which should govern in framing laws relating to the public health, and especially those relating to quarantine,—that such laws should provide for action first, and explanations afterwards. He quoted the well-known maxim "*Salus populi suprema est lex.*" "The welfare of the people is the supreme law." The penal section of the Michigan quarantine law is woefully inadequate in that this "Supreme law" is to be administered and upheld (or degraded) not by the Supreme Court, nor by the Circuit Court, nor even by a justice of the peace, but by a petit jury. The result is about what would be expected: In the recent case, that of the agent of the "Soo" railroad, which most intelligent citizens of Michigan now know is wilfully disobeying the Michigan quarantine law and rules, the agent was acquitted. Pending efforts to uphold the law, the rules for disinfection should be acted up to; but they are not, and thus far our legal advisers—the Attorney General and Prosecuting Attorney, do not find any way to enforce such action.

In this law, relative to this most vital subject of keeping dangerous diseases out of Michigan, a petit jury out-ranks the State Board of Health. The subjects of the causation, restriction, and prevention of the communicable diseases are now well under the domain of science; they rest upon a surer scientific basis than do the sciences of heat and light, as taught in our colleges; but the sciences of sanitary chemistry, bacteriology, and other sanitary sciences, are new, and not known to the average juryman. The facts, well known to the State Board of Health, as to the prevalence of each dangerous disease in foreign countries, and the entire absence of several such diseases from this State except as brought here by immigrants, and the comparative immunity here from several other of the most dangerous diseases—such facts are not realized by the average member of a jury.

Then, again, the law supposes a person charged with crime to be innocent until proved to be guilty. This is right so far as the individual is concerned; but the question whether or not dangerous diseases shall be kept out of a State should not wait for a petit jury to decide in a given case, or in a large number of cases whether a certain man has or has not committed an offense under a law.

Who is best qualified to judge of the correctness of a strictly sanitary problem? Is there in Michigan any court, jury, or other legally constituted organization so well qualified as is the State Board of Health? Apparently the legislature thought not; because the law makes it the duty of the State Board of Health to decide when there is danger of the introduction of disease, and what measures of disinfection shall be required at the State line, and elsewhere when needed, and to frame general rules for the prevention of the introduction and spread of disease. If, then, the State Board of Health is the best authority in the State on such subjects, the law should be such that, in any case of threatened danger to the public from the introduction and spread of disease, the presumption is in favor of the correctness of the action of the State Board of Health, until such action is legally proved to be wrong.

Given a legally-constituted State Board, its members sworn to "support the Constitution of the United States, and the Constitution of this State," and to faithfully fulfill the laws of this State, those laws having been framed by legislators who have taken a similar oath, it seems to me that it is to be presumed, until it is legally proved to the contrary, that such officers are doing the will of the people of the State. And if there is any instance where this presumption should hold, it is in the case of the enforcement of quarantine laws,—where speedy, vigilant and constant action is required to protect that "welfare of the people" which has so generally been declared to be the "Supreme law". ("*Salus populi suprema est lex.*")

It is now well-known to sanitarians that the most dangerous diseases are not spread by nuisances. Therefore this subject of the prevention of the introduction and spread of dangerous diseases, by isolation and disinfecton of infected persons and things, is of vastly more consequence, to the people of Michigan, than is the general subject of nuisances. Yet although there is no similar law relating to dangerous diseases, the State law says: "The Circuit Court for any county shall have equity jurisdiction in all matters concerning nuisances, where there is not a plain, adequate and complete remedy at law and may grant injunctions to stay or prevent nuisances." § 7965 Howell's.

Unless the common law and court rules give adequate power to circuit courts, there is urgent need for a State law relating to the prevention of the introduction and spread of dangerous diseases on a principle similar to that of the section quoted above.

If the present law is to hold, I respectfully suggest the following additional section:—

Sec. 8. The circuit courts shall have equity jurisdiction in all cases of neglect or refusal to obey the Rules of the State Board of Health, or the order of its duly-appointed inspector, made in accordance with the provisions of this Act, and shall have power to order any such apparent violator of law to show cause why the rule, order, or law should not be enforced; and, pending such action, to order and enforce strict compliance with the rules made under this law by the State Board of Health, the decisions of that Board under this law so far as they relate to a strictly sanitary subject, being hereby declared to be final.

*Lansing, Oct., 1893.*

### BRIEF HISTORY OF ACTION TAKEN.

Robert Finch, a railroad agent at Sault Ste. Marie, violated and continued to violate the Rules of the State Board of Health, relative to the detention and disinfection of immigrant baggage, the Rules having been made under Act 47, Laws of 1893. Inspector Rogers made complaint to the Justice of the Peace, and asked that a warrant for the arrest of Agent Finch be issued. Justice Frank R. Warner refused to issue the warrant, holding that Act 47, Laws of 1893, is unconstitutional. John Hurst, the Prosecuting Attorney, then made application to the Circuit Judge to see why a peremptory mandamus should not issue compelling the Justice to issue the warrant for the arrest of the offender. The hearing was held before Judge Joseph H. Steere, of the eleventh judicial circuit, December 8, 1893, and the following is a copy of the finding:

### *Decision by Judge Joseph H. Steere.*

STATE OF MICHIGAN.—IN THE CIRCUIT COURT FOR THE COUNTY OF CHIPPEWA.

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| JOHN HURST, *Relator*,<br>vs.<br>FRANK R. WARNER, *Respondent*. | Mandamus. |

Application for writ of mandamus to compel Frank R. Warner, a Justice of the Peace, to entertain criminal complaint and to proceed with the trial of a case sought to be brought for violation of rules promulgated by the State Board of Health under the provisions of Act No. 47 of the Session Laws of 1893.

*Statement of Issue.*

In his application for a mandamus the petitioner sets forth that on November 28, 1893, he, being the Prosecuting Attorney of Chippewa county, formally presented a criminal complaint, made under oath and in writing, to the Respondent, who was a duly qualified Justice of the Peace of said county, and then and there asked from him a warrant for the arrest of one Robert B. Finch, who was charged in said complaint with violating certain rules and orders of the Michigan State Board of Health.

That the complaint was accompanied by an order from the Prosecuting Attorney for a warrant, and that he then offered to produce other and further testimony to substantiate the complaint, having witnesses in attendance for that purpose.

The petitioner further alleges that said justice thereupon refused to issue a warrant upon said complaint for the arrest of said Robert B. Finch and persisted in so doing. and gave the following reasons for said refusal.

1. "Because Act No. 230 of the Session Laws of 1885, as amended by Act No. 47 of the Laws of 1893, of the Legislature of this State, was unconstitutional and void."

2. "Because that even if said Act was not void, Rule No. 2 of the Board of Health of said State of Michigan, under which this complaint was drawn, was not authorized by said Act and because the Board of Health exceeded their authority in passing said rule No. 2, and that he did not wish to make this county any unnecessary expense and cost."

A copy of the complaint and order for a warrant are attached to and made a part of the petition.

The complaint is carefully drawn and properly states an offense under the Statute and rules, if they are valid.

His return is, in substance, a demurrer.

In his answer filed in response to the order to show cause, he admits the facts stated in the petition, but alleges, as the reasons why a mandamus should not issue, as follows:

"That the Statute, Act No. 230 of the Laws of 1885, as amended by Act No. 47 of the Laws of 1893 of the State of Michigan, under which the rules of the Board of Health of the State of Michigan are adopted, is unconstitutional and void in that it delegates legislative authority to an appointive board and assumes to give said board the power to enact rules, a violation of which, when framed and published (though the manner of publication is not prescribed) is made an offense punishable by a fine and imprisonment, and to give to said Board the further power to change, suspend, revoke and re-enact said rules whenever certain conditions are shown to the satisfaction of said Board to exist, though the manner in which the existence of such conditions is to be shown is not pointed out."

The respondent further alleges that, "even if said Statute is constitutional and valid, Rule No. 2 of the said Board of Health, a copy of which is made a part of this answer, for a violation of which said complaint was made and respondent is asked to issue a warrant, is void, for the reason that said rule is not authorized by said Act No. 230 of the Laws of 1885 as amended by Act No. 47 of the Laws of 1893, nor by any other statute of the State of Michigan, and that for these reasons this respondent should not be compelled to issue a warrant for the arrest of the said Robert B. Finch upon said complaint."

Upon this issue argument was had.

*Opinion.*

The Mandamus will be denied for the reason that the Statute under which these criminal proceedings are sought to be brought is invalid in the particular that it seeks to delegate to a non-elective subordinate board legislative powers to create a misdemeanor, and is in violation of Sections 1 and 38 of Article 4 of the Constitution of the State of Michigan.

Section 1 of said Article provides: "The legislative power is vested in a Senate and House of Representatives."

Section 38 of said Article is as follows: "The Legislature may confer upon organized townships, incorporated townships and villages and upon the Board of Supervisors of the several counties such powers of a local, legislative, and administrative character as they may deem proper."

The latter article is clearly a constitutional limitation defining the scope within which the Legislature may delegate its legislative powers to subordinate bodies. The State Board of Health is not enumerated among those bodies to which this power can be delegated, and, by implication of law, is consequently excluded from those upon whom such power can be conferred.

It seems clear that the Legislature cannot confer upon the State Board of Health any legislative functions. The statute, to the extent that it assumes to do so, is certainly unconstitutional and void.

3 Mich., 343.
29 Mich., 460.
24 Mich., 108.
Cooley on Constitutional Limitations, p. 139, and cases cited.

On behalf of the petitioner, in support of the application for a mandamus, it is contended that the law does not delegate, and cannot be construed as attempting to delegate any legislative power; that it only authorizes the Board to make rules within certain well defined limits, giving it no discretion to declare penalties, the penalty being fixed by the law itself.

Counsel cites to statutes clearly constitutional in which it is provided that an officer shall give notice to do or not to do a certain thing, on failure to observe which notice a person shall be deemed guilty of the misdemeanor, etc. Authority is also cited to the effect that it is not delegated power to be authorized to determine some fact or condition of things upon which the law makes its own operations depend.

Locke's appeal, 72 Pa. St., 491.

It is also well reasoned that there are many things upon which wise legislation depends which cannot be known to the law-making power and must therefore be suggested afterward and determined subsequent to the enactment of the law.

This argument would be conclusive if the scheme of the statute in controversy went no further than to authorize the Board to give notice to do or not to do certain things therein stated, or to determine certain facts or a certain state of facts set forth in the law, and upon which the law would become operative, but it seems to us that the Legislature, in the statute in question, attempted to go much further. The Board is first authorized to determine certain facts in their discretion relative to passengers and baggage coming from infected districts. Then, having determined those facts, it is further authorized, as a discretionary matter, to formulate rules upon the subject, a violation of which rules, when formulated and published, constitute a misdemeanor and put in operation the criminal laws of the State of Michigan.

Those rules may involve, and as formulated do involve, certain acts and conditions of things which are not recited in the statute, a violation of which constitute a misdemeanor, but without which no offense would exist.

We have no doubt of the authority of the legislature to authorize the Board to adopt rules essential to the proper administration of the law, involving such measures as may be necessary to enforce those rules, such as the detention of a person or baggage, preventing their entry into the country, and perhaps seizure and forfeiture of property. But we don't think that misdemeanors can be created and criminal prosecutions authorized by such indirect and delegated proceedings as those contemplated by the statute in question. Such seems to be the view taken by the Supreme Court of California in the *ex parte* case of John Cox on Habeas Corpus, 63 Cal., p. 21, and the case of the Board of Harbor Commissioners of the Port of Eureka, Appellant, vs. The Excelsior Redwood Company, Respondent, 88 Cal., p. 491.

Our attention has been called to the matters discussed in the case of the Minneapolis, St. Paul and Sault Ste. Marie R'y Co. against the State Board of Health of Michigan, decided in the Circuit Court of the United States for the Western District of Michigan, northern division, decided by Judges Severens and Sage. In that case the motion for a preliminary injunction was overruled, the question involved being, mainly, the authority of the States to enact laws and provide rules relative to quarantine matters, under Section 8 of Article 1 of the Constitution of the United States and certain treaties existing between the United States and foreign countries. The issues decided are not raised in the case at bar, and the question which we have before us, though referred to, was not decided in that opinion, the Court saying: "We do not deem it necessary to express an opinion whether the provision of the Michigan Statute making it a misdemeanor to violate the rules of the State Board of Health adopted in pursuance of the Act, is constitutional or valid, for we should not, even if we were of the opinion that it is unconstitutional, undertake to issue an injunction against criminal prosecution by the State," leaving the question before us undetermined.

Our attention is called to the fact that the Federal quarantine laws contain provisions for the promulgation and enforcement of rules by proper officers, and that those rules have been long in existence and enforced without question.

We recognize that these laws and rules, with the usage in their administration, are entitled to respectful consideration, and might, in a doubtful case, in the absence of other authority, though not binding in the interpretation of our State laws, practically control a decision. But, after a careful examination of the laws to which our attention is called, being a pamphlet issued April 4, 1893, by the Treasury department, entitled "Laws and regulations for the Maritime Quarantines of the United States," we fail to there find any authority to resort to criminal procedure to enforce the quarantine *rules*, or anything in the statutes making the violation of those *rules* a criminal offense. Violations of quarantine *laws* and misconduct of its officers are made criminal offenses punishable by heavy penalties, but the *rules* are to be enforced by other methods such as the exclusion of the parties who fail to observe them from entering the country or importing property, or by the seizure and detention of a person or property for a limited period, or the seizure and forfeiture of property, as for a violation of the revenue laws.

We fully recognize, with Counsel for petitioner, all that has been urged relative to the valuable services which the Michigan State Board of Health has rendered the State, and the difficulties which beset it in the performance of its duties. We cheerfully endorse all which has been said as to the importance of rigid quarantine laws to protect the health and lives of our citizens from the importation of infectious diseases. But we know that the Courts universally recognize that the State, through its proper legislative body, has ample power to go to extremes in the enactment of rigid laws upon the subject, and to provide heavy penalties for their violation. This case simply involves a constitutional question as to the method of getting the proper provisions upon that subject in legal shape for their enforcement. It is our opinion that where it is sought to make a violation of any quarantine regulation a crime, the legislature must, by its own enactment, clearly set forth the facts and conditions creating the offense in the statute itself, and that it cannot leave the question open for subsequent action by another body, and delegate the authority to create a misdemeanor, as has been attempted in the statute in question.

For these reasons the mandamus is denied but, inasmuch as this is a friendly litigation, carried on by all parties in interest in good faith for the purpose of obtaining a decision upon an important and doubtful question, the decision is without costs.

*Dated December 18, 1893.* J. H. STEERE,
*Circuit Judge.*

Additional information, discussions, etc., regarding the Michigan Inspection of Immigrants and Travelers, may be found in the proceedings of meetings of the Board, printed on preceding pages of this Report; also in the article on Cholera, on pages 369-372 of this Report.

### MICHIGAN INSPECTION OF IMMIGRANTS AND TRAVELERS DISCONTINUED.

At the meeting of the Board, January 12, 1894, the subject of the further continuance of the Michigan inspection of immigrants was discussed. Secretary Baker thought that the Michigan inspection of immigrants, which has been in progress for some time, has done much to prevent the introduction and spread of dangerous communicable diseases. He thought also that the stand the Michigan State Board had taken has been the means of raising the standard of quarantine in this country, tending as it has toward the disinfection of the baggage of all immigrants coming into this country. It is not improbable that the inspection at the border has been the means of keeping Michigan free from small-pox, and it is probable that it has lessened the introduction of other diseases. The Michigan rules for disinfection were carried out during the past summer at Levis, near Quebec, and are now being carried out at Halifax under the direction of Dr. Wickwire, Port Health Officer at Halifax, Small-pox is now quite prevalent in several States, but it is hoped that Michigan will not be visited by this disease. Owing to the depression in mining, lumbering, and in other business, immigration will probably be much lessened.

The recent judicial decision was discussed, and a resolution was adopted, as follows:

*Resolved*, That in view of the adverse decision of the Hon. Joseph H. Steere, of the eleventh Judicial Circuit, declaring the penalty portion of the Michigan quarantine law unconstitutional, the immigrant inspection at the Michigan border is hereby suspended from and after January 13, 1894.

It is understood that legal measures have been taken to obtain a decision on this subject by the Supreme Court. The decision of the Supreme Court will be found printed in the next (1895) Annual Report.

## THE TEACHING OF SANITARY SCIENCE AT MICHIGAN COLLEGES.

### PROPOSED ESTABLISHMENT OF A CHAIR OF SANITARY SCIENCE AT THE STATE AGRICULTURAL COLLEGE.

In a circular letter December 2, the Secretary wrote to each member of the State Board of Health that "An opportunity has arisen on a subject which I have long held in mind,—the establishment of a chair of hygiene at the State Agricultural College, and I have acted promptly for myself, but not having opportunity to consult members of this Board I am not certain that they fully concur in both the recommendations in my memorial to the State Board of Agriculture (for the creation of a chair, and for the appointment of Prof. Brewer) so I send a copy herewith, and ask you to inform me as soon as practicable, so that the full influence of this Board can be exerted so far as members of the Board direct, and no further." As said in the foregoing letter, there was an "opportunity" in the fact that the services of a good man could be secured at that time; an opportunity which had not presented itself before; and it was because of this opportunity that the Secretary took immediate action, thinking that if the right man could be had, the probabilities of the establishment of a chair were greater than they would be if the State Board of Health urged the establishment of the chair, but could not provide for a man to fill the same. Of course the State Board was not urging that any individual be appointed, but only that some good reliable Professor able to teach modern sanitary science, be called to fill the chair. There were perhaps others who would acceptably fill the chair, but the Secretary had not before had the opportunity to recommend the establishment of a professorship and at the same time suggest one who could fill it.

The following is a copy of the memorial which had been prepared by the Secretary, and sent to the members of this State Board. So far as it related to the establishment of a chair of sanitary science, it received the approval of a majority of the Board, before it was formally placed before the State Board of Agriculture at their meeting, at Lansing, December 4, 1893. Following the memorial are letters which the Secretary received from the members of the State Board of Health, and placed before the Board of Agriculture. The memorial and letters are as follows:

### MEMORIAL FOR THE ESTABLISHMENT OF A CHAIR OF HYGIENE AT THE MICHIGAN STATE AGRICULTURAL COLLEGE.

STATE BOARD OF HEALTH, MICHIGAN,
OFFICE OF THE SECRETARY,
*Lansing, December 1, 1893.*

*To the Honorable, the Michigan State Board of Agriculture:*

GENTLEMEN—Permit me to memorialize your Honorable board for the appointment of a Professor of Hygiene at the State Agricultural College, and to suggest a few of the many reasons why at this one of the most important colleges in Michigan, the teaching of sanitary science should be prominent.

A large proportion of the graduates and students at the Agricultural College will occupy prominent positions among the people of the State, being leading agriculturalists, horticulturists, dairymen, lawyers, teachers, physicians, and business men. As has been the fact in the past, many of them will be found in the State Legislature, framing laws for the government of the whole people. It is for the general good of the people of Michigan that these leaders of thought and action throughout the State shall be well grounded in that sort of knowledge which is of most worth. I presume that all of you are familiar with the result of the inquiry into that question—"What knowledge is of most worth?" which was so ably worked out by that great philosopher, Herbert Spencer, in his book on "Education." He seems to have demonstrated that that knowledge is of "most worth" "which tends directly to preserve life;" and that next, in the scale of value, is that knowledge which tends indirectly to preserve life, leaving, as not even of secondary importance, many of the branches of knowledge so frequently taught in our schools and colleges. Sanitary science includes both of these two classes of knowledge which have thus been demonstrated to be of "most worth" and as of next most worth,—that class of knowledge which tends directly to preserve life, and that class of knowledge which tends indirectly to preserve life.

It is understood that in order to preserve life one must have a means of earning a livelihood; but means of subsistence have advanced so rapidly that for the immediate future all sorts of food products are cheap and plentiful.

Sanitary science has made wonderful progress in recent years, so there is much more now than formerly that is positively known, and which can be taught to students. There are now many well-developed branches of sanitary science. We have, therefore, an abundant store of that "knowledge which is of most worth" which is now available to the teacher of hygiene. That knowledge is gradually being disseminated through the action of State Boards of Health. But it is not for the public interests that the graduates and students of the State Agricultural College, who are to be among the leaders of thought and action throughout the State, shall be merely on a level with the common, educated people concerning these most important of all public questions—relative to the high interests of human health and life. Fortunately, the Michigan State Agricultural College has among its professors one who has been a leader in sanitary progress—Prof. R. C. Kedzie has been president of the State Board of Health, and president of the American Public Health Association, and much of value in a sanitary way is taught by Prof. Kedzie. but his work in this direction is necessarily narrowed by the requirements of his duties as professor of chemistry. A similar remark applies to the work of Prof. F. S. Kedzie, who also has given much attention to sanitary subjects. Prof. Grange has given attention to at least one branch of sanitary science—bacteriology; but his duties as professor of veterinary science and practice necessarily engross his attention.

Permit me to commend to you, as a professor of hygiene—Prof. F. W. Brewer, who for the past year and a half has been Superintendent of the Bureau of Hygiene in the Department of Liberal Arts, at the World's Columbian Exposition, who previous to that time was for about a year employed at the experiment station of the State University of Nebraska, and previous to that was an assistant to Prof. Vaughan at the Michigan University, he being a graduate of the Medical Department of the Michigan University.

A year or more ago, Prof. Brewer was an applicant for the position of bacteriologist at the Michigan Agricultural College, and sent testimonials of his fitness for the position. I cannot claim personal knowledge of his acquirements in bacteriology or in other branches of sanitary science, or of his qualities as a teacher; but I can claim to know that he has been an earnest student with Prof. Vaughan at our University, that he has studied the Vital Statistics of Michigan, that he has been recommended by those with whom he has been associated, and that his work in connection with the World's Fair has brought him in contact with the best lines of sanitary work being done throughout this country, and some of that being done in other countries. If you employ him as a professor of hygiene and bacteriology, you will have one who will, I believe, teach bacteriology not only with reference to the many important bearings upon agriculture, but who will teach it also with reference to its numerous exceedingly important bearings upon the life and health of humanity; one who will, I believe, teach hygiene not as it was before the recent great progress, but as it has been enriched by the wonderful discoveries of Pasteur, Koch, Kitisato, and others.

I hand you herewith a letter which I have received from Prof. Brewer, and a copy of a number of commendatory letters relating to him.

Hoping that your Honorable Board will appoint some person to the important position of Professor of Hygiene, and commending to you for that position Professor Brewer, I am,

Very respectfully,
HENRY B. BAKER.

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MICHIGAN UNIVERSITY,
OFFICE OF DEAN OF THE MEDICAL DEPARTMENT,
*Ann Arbor, Mich., December 2, 1893.*

*Dr. Henry B. Baker, Lansing, Michigan:*

DEAR DOCTOR:—It will be impossible for me to come to Lansing next Monday. I should be glad to do so, and should also be glad to do anything in my power to aid in the establishment of a chair of Hygiene at the Agricultural College, and I gladly join you in the recommendation of my old friend and former student, Doctor Brewer, for a professorship in that college. Dr. Brewer was my assistant for some three years, and I can say that he is conscientious and skillful in his work. The Agricultural College can make no mistake in establishing a chair of hygiene and in calling Dr. Brewer to occupy the same.

Yours truly,
VICTOR C. VAUGHAN.

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STATE BOARD OF HEALTH,
MICHIGAN,
*Grand Rapids, Mich., Dec. 3, 1893.*

DEAR DOCTOR BAKER:—I most heartily commend and second all you say regarding the importance of the establishment of a chair of sanitary science in our Agricultural College. Indeed, I was surprised to learn that heretofore there has been no special attention given to that subject there. In such an institution I think it would be much more important to have a chair in Sanitary or Hygienic Science than to have a chair of Modern Languages.

As to the recommendation of a particular person to fill such chair, it may be deemed inadvisable for our board to take any action, although personally I would be willing to sanction the choice of yourself, or Dr. Vaughan.

Very respectfully,
S. G. MILNER.

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STATE BOARD OF HEALTH,
MICHIGAN,
*Lansing, December 4, 1893.*

*Dr. H. B. Baker, Secretary State Board of Health:*

DEAR SIR:—I am in hearty sympathy with the views expressed by you, relative to the importance of establishing a chair of Hygiene at the State Agricultural College, as embodied in your communication to the State Board of Agriculture under date of Dec. 1. The knowledge gained during the last twenty years concerning the causes of all communicable diseases and the means for their prevention is second to no other knowledge of this marvelous age, in its influence upon human life, human health and human happiness. Such being the case it would seem that little argument should be necessary to convince any thinking person that this knowledge should be given the greatest possible publicity. The most practical means to this end would certainly seem to be the employment of teachers thoroughly equipped for the work in all our institutions of learning. While its rudiments should be and I doubt not soon will be taught in the lower grades of these institutions, our common schools, yet it is in the higher, which have to do with youth who are about to take up the duties of citizenship where it must prove of the greatest value. The Michigan Agricultural College is second to none in this country for keeping abreast of the scientific investigations of our day and of impressing them upon the minds of its graduates. It is greatly to be hoped that the new and valuable facts concerning human life and health which form so important a section of these investigations may be incorporated into its curriculum. I cannot doubt but that such a step will greatly increase its efficiency and add to its already noble reputation.

Very truly yours,
Frank Wells,
*President Mich. State Board of Health.*

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STATE BOARD OF HEALTH,
Michigan,
*Pontiac, December 5, 1893.*

*Dr. Henry B. Baker, Secretary of the State Board of Health:*

My Dear Doctor:—Your letter of the 2d inst. relative to the establishment of a chair of hygiene at the Agricultural College and the appointment of Prof. Brewer to the chair, was received yesterday, but, owing to an unusual amount of work, was not read until this evening. Of course this reply will probably not reach you as soon as you hoped it would, but I wish to say that I heartily concur in everything you say in your memorial to the Board of Agriculture. Though I know Prof. Brewer only by reputation, I believe him fully qualified for the important place.

Very truly yours,
Mason W. Gray.

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STATE BOARD OF HEALTH,
Michigan,
*Albion, December 4, 1893.*

Dear Dr. Baker:—Your letter of yesterday, concerning the establishment of a chair of sanitary science at the Agricultural College, is at hand. It seems to me that the influence of the Board should be used to the fullest extent whenever it could bring about such a result, not alone in this case but in all others. The time should come when there should be no institution of any grade that did not give particular attentention to this most important subject.

As to the Board's recommending a special candidate, I am not so clear; you can do it personally, and I could do the same, but we should, I fear, bring criticism on us if we combine in any particular person's interest. I do not know Prof. Brewer, but you do, and you could consistently work for his appointment.

Yours very respectfully,
Delos Fall.

## SANITARY SCIENCE SHOULD BE TAUGHT IN MICHIGAN COLLEGES.

At the meeting of the State Board of Health January 12, 1894, the subject of a Chair of Sanitary Science at the State Normal School, and at the State Agricultural College, was presented by Doctor Baker. He mentioned that the State Board of Agriculture had already been memorialized by the president and other members of this Board and himself, to establish a chair of hygiene; but he thought the Board as a whole should continue to exert its influence. He argued that the State law compelled the common schools of Michigan to devote time to the teaching of hygiene, but that there was not much provision for the proper education of those teachers who are compelled to teach hygiene. The State Normal School is devoted to the training and education of teachers, and the State Agricultural College has its vacation in the winter, in order that its students may teach, yet neither of these institutions has a chair of Sanitary Science.* The State Board of Health had already put forth its efforts for such a chair at the Michigan University, and a Laboratory of Hygiene had been established and is now doing great good. Dr. Baker thought that the youngest pupil in our schools should have an idea of how the most dangerous communicable diseases are spread, and that it would be just as practicable to teach them restrictive measures as it is to teach them all about the bones, muscles, and nerves, as is now attempted. Each pupil should know also just what disease causes most deaths in Michigan, and just how it may be prevented or avoided. But how are these pupils to be taught such subjects, when there is practically no adequate provision for the education of the teachers?

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* It was afterwards pointed out by a professor at the Normal School that notwithstanding this is true yet much is being done there for the education of teachers in some branches of sanitary science.

Dr. Baker said: The work of the State Board of Health is, to a great extent, educational; and it is effective when brought to bear upon the neighbors of a residence placarded for a dangerous disease. Eventually every part of the State is thus reached by its instructions, at such times of especial danger. But this is a slow process; and, although in the twenty years of the work of the State Board of Health the death-rate from scarlet fever has been reduced at least one-half, yet the statistics prove that in those localities in which the teachings of the State Board have been wholly complied with by the people, the death-rate has been not more than one-fifth what it was where this has not been done. This implies that if this teaching could, in some way, be made to reach every locality in the State, the death rate should be reduced by four-fifths instead of by one-half. What is needed for the greater saving of life from scarlet fever, and from the other dangerous diseases—because the same principle applies to them, is the proper education of all the young people of the State. The State laws require that Hygiene shall be taught in all the schools. But how is it taught? How can it be properly taught so long as there are no text-books which teach sanitary science as it is taught by the State Board of Health, and so long as the teachers themselves are not properly prepared? How can the teacher be properly prepared?

It seems plain that in order that the teachers shall be properly prepared, their places of preparation must be such as will make this possible. Many of the teachers are trained for their work at the State Normal School. J.E. Hammond, Deputy Supt. of Public Instruction, says: "In all two thousand two hundred students have graduated from the school, besides many others who, not having completed the course, are numbered among the progressive teachers of the State. Michigan is justly proud of the work of this great institution, and its influence is felt in almost every village and city through the entire State."*

The State Agricultural College also is a school which supplies quite a number of teachers, the college vacation being in the winter for the especial purpose of permitting the students to teach.

Prof. Fall said he was very glad to say that Albion College was teaching Sanitary Science. A large class of the best students in the college have this course of training.

On motion of Prof. Fall, the Board voted that a committee of three be appointed by the President to memorialize the State Board of Education to establish a Chair of Sanitary Science at the State Normal School. Prof. Fall, of Albion, Dr. Baker, and Dr. Milner, of Grand Rapids, were appointed to act as this committee.

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*"Michigan and its Resources, 1893," p. 187.

On motion of Dr. Baker, it was voted that Dr. Gray of Pontiac, act as chairman of a committee to memorialize the State Board of Agriculture to establish a Chair of Sanitary Science at the State Agricultural College. It was also voted that President Wells and Prof. Vaughan of the University be the other members of this committee.

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## BURNING OF PEOPLE IN RAILWAY WRECKS MIGHT BE PREVENTED.

At the meeting of the State Board of Health January 12, 1894, the Secretary reported that:—During the last quarter (Nov. 15, 1893), the State Commissioner of Railroads referred to the Secretary of the State Board of Health a letter which he had received from John S. Lorimer, General Storekeeper of the Chicago and Grand Trunk Railway, relative to the subject of hand fire extinguishers on railroad coaches, to be used in case of wrecks, to prevent the burning of railway coaches loaded with human beings, as occurred recently in the fearful accidents at Jackson and Battle Creek where many lives were lost, and others received injuries that would last them through their lives.

With the letter of Mr. Lorimer, the Commissioner of Railroads gave to the Secretary of the State Board of Health, a circular which had been sent out from the Commissioner's Office in which was urged upon General Managers and Superintendents of Railroads the importance of taking every precaution in preventing the further occurrence of accidents on railroads, and the burning alive of the human beings intrusted to the railroads for safe transportation. The Commissioner urgently recommended the placing of hand fire extinguishers in all railroad coaches within easy reach and most convenient for use, the use of oil which would stand the burning test of 300 degrees or more, as provided by the statutes of Michigan, and the use of the safest known pattern of car heaters.

The Secretary of the State Board of Health made a report to the Hon. S. R. Billings, State Commissioner of Railroads, of which the following is a copy:

"Relative to the question asked of you by John S. Lorimer, General Storekeeper of the Chicago and Grand Trunk Railway, in his letter of Nov. 14, referred to me yesterday. I can report that the State Board of Health has not recently considered the exact subject of hand fire extinguishers for use on passenger trains; but some years ago the general subject of 'The Conditions of Inflammability' was very thoroughly investigated and reported upon by Prof. R. C. Kedzie, then a member of this Board, and I take pleasure in placing that report before you, because it will, I think, be found valuable for its suggestiveness in relation to the subject of the prevention of fires on wrecked passenger trains; because it is probable that if the cars, interior fittings and contents, could be made incombustible, or even incapable of burning with a flame, a great part of the danger from fire, would be done away with. That this can be done so far as relates to the cars and fittings, at an expense which would be justifiable, I have no doubt. The report to which I refer is published in the Annual Report of this Board for the year 1880. I refer especially to pages 180-183.

"The substances which can be applied to wood, cloth, paper, etc., and thus render such substances incapable of burning with a flame, are common, not expensive, and are numerous, so that no difficulty should be found in selecting those which will not interfere with the ornamentation of the car or its fittings.

"In complying with your important suggestion that 'All railroad companies doing passenger business in this State,—provide all coaches, baggage, express, and mail cars with the best known appliances adapted for hand use, to extinguish fire; such fire extinguishers to be placed within easy reach, and most convenient for use,' some of the principles set forth in Prof. Kedzie's report should be useful to the storekeepers for the several railroads. In that report a number of solutions are mentioned which when applied to wood-work, cloth, paper, etc., render such articles not easily inflammable. Solutions to be kept in the so-called 'hand grenades,' for extinguishing fire, must, I suppose, be of such strength that they will not freeze and thus break the glass or other container; but I think this is easily accomplished. A saturated solution of common salt would not freeze, and would be a useful article in such 'hand grenades.' But it is possible that there are substances much more useful than that. (Many a soot fire in a chimney has been extinguished with a few handfulls of common salt). By having two kinds of grenades kept for use together, each to break into the other, one containing a solution of a bicarbonate, and the other a solution of an acid sulphate, carbonic acid gas could be liberated as is done in the chemical fire engines, on a principle similar to that of the 'Babcock Fire Extinguisher.'

"If desired, I have no doubt this Board would have a special investigation made to ascertain what methods would be most feasible, or at least what scientific principles are available. If you wish, I will submit the subject to the Board at its next meeting.

"Herewith I send you a copy of the Report of this Board for 1880, containing the article by Prof. Kedzie, which I have mentioned.

"Very respectfully,
"HENRY B. BAKER,
"*Secretary.*"

## IS THE USE OF ATROPINE IN FITTING GLASSES A BRANCH OF THE PRACTICE OF MEDICINE.

At the meeting of the State Board of Health April 13, 1894, the Secretary mentioned that he had received letters asking whether or not atropine could legally be used in fitting glasses in cases where the optician was not a Doctor of Medicine, and whether or not such an optician would be required to comply with the State law relative to the practice of medicine. Recently the Secretary had received an interesting letter on this subject from a prominent physician in Michigan, which he read to the members of the Board. The letter is as follows:

*Grand Rapids, Michigan, February 21, 1894.*

*H. B. Baker, M. D., Secretary State Board of Health, Lansing, Michigan.*

MY DEAR DOCTOR:—There is a law in the State of Michigan to regulate the practice of medicine ("To promote the public health"). Under said law, a man is required to register, etc., before practicing medicine in any branch, or prescribing, etc. In these days the practice of medicine includes all specialties, and any specialty or part thereof is the practice of medicine, in the meaning of the law. Now, is not the use of atropine in the eyes in fitting glasses a prescription or prescribing for a patient in the same sense that making a plate and extracting the teeth preparatory thereto, is practicing dentistry? If persons should have trouble with their eyes, and think they needed glasses and go to an advertising optician (spectacle vender) and he was in the habit of using atropine in eyes, now suppose that this said patient had acute or chronic glaucoma, the optician would not know it, having no knowledge of opthalmology, and he would put atropine into the patient's eyes, it might be the cause of the patient losing the sight of both eyes. You see the point. The use of atropine or any midriatic in glaucoma does harm, and frequently causes blindness, therefore the necessity of great care in selecting cases in which there are eye symptoms in which atropine is a safe remedy. The case in point is a spectacle vender here who fits glasses, and uses atropine in eyes for fitting. Is this not practicing medicine, and should men uneducated (in medicine) be allowed to tinker with eyes, when they are the most delicate organs of the body, and in the face of the fact that so many people loose their eyesight by neglect and improper treatment? I have a patient whose eyes were undoubtedly affected with glaucoma; they pained her and she wanted to have glasses fitted by an optician; he used atropine in her eyes which increased her pain and she finally left him and went to another optician who completed the test, but she had pain and symptoms of glaucoma for a long time, and her sight is very much impaired, so glasses will not help her; had she gone to an oculist he would have detected the glaucoma and given her proper treatment and saved her eyes. This is a matter of great importance, and I should like your opinion. I believe opticians have no right to fit glasses inasmuch as the majority of the young people who need glasses should have them fitted by a competent oculist. If people want to call for glasses all right, but opticians have no right to advertise to fit them any more than a druggist has to advertise to prescribe for all the ills of man (free of charge) to get customers when he is not a Doctor. Please let me hear from you.

Very truly yours,

D. M. GREENE.

The members of the State Board of Health thought that a person using atropine in the eyes for the purpose of fitting glasses was practicing medicine, and should comply with the State law relative to the practice of medicine.

## CONSUMPTION IS A DISEASE DANGEROUS TO THE PUBLIC HEALTH.

A SPECIAL REPORT BY THE SECRETARY, AT THE MEETING OF THE STATE BOARD OF HEALTH APRIL 13, 1894.

So far as known at this office, the Michigan State Board of Health was the first State Board to take action for the notification of this most important cause of deaths. Sept. 30, 1893, this Board officially declared consumption and other diseases due to the *Bacillis tuberculosis* to be "diseases dangerous to the public health" and, in accordance with Sections 1675 and 1676 Howell's Statutes, to be reported by householders and physicians to the local health officer, as soon as such a disease is recognized. This recent action was for the legal control. This Board has carried on an educational campaign since the year 1881, when it first published and distributed information relative to the contagious character and prevention of consumption. Since that time much has been written, published and distributed on this subject by this Board. In Sept., 1891, the Board published a four-page leaflet on "The Restriction and Prevention of Consumption," to the number of 5,000 copies. One other edition of five thousand copies of the pamphlet has been printed. It is believed that the pamphlet has been instrumental in the education of the people for the restriction of tubercular diseases.

### *Action by the New York City Board of Health.*

According to the *Sanitarian* of March, 1894, the New York City Board of Health, on July 13, 1893, took action for the restriction and prevention of tuberculosis. The Report of Dr. Cyrus Edson, Chairman of the Sanitary Committee of the City Board of Health, was adopted. It summarized a report which Dr. Herman M. Biggs, the bacteriologist of the Department, had made, and which was, in the opinion of Dr. Edson, timely and well advised. Dr. Biggs' report is summed up in the following three statements: *First*, Tuberculosis is a contagious disease, and is distinctly preventable; *Second*, It is acquired by direct transmission of the tubercle bacilli from the sick to the well, usually by the means of the dried and pulverized sputum floating in the dust of the air; and *Third*, It can be largely prevented by simple and easily applied measures of cleanliness and disinfection.

Dr. Edson's report, which was adopted, included recommendations: 1, that an instructive circular be prepared and distributed; 2, that physicians and other persons having knowledege of the existence of a case, report it to the Health Department within seven days; 3, that the medical sanitary inspectors should investigate the cases and get samples of the sputa for diagnostic purposes, as is done in diphtheria, and if tubercle bacilli are found the inspector is to inform the physician and request him to instruct the patient and persons liable to be endangered, or if the physician prefers the inspector gives these notices; 4, that the Board urge upon hospital authorities of the city of New York the importance of separation so far as possible in the hospitals in this city of persons suffering from pulmonary tuberculosis from those affected with other diseases, and urge that proper wards be set apart for the exclusive treatment of this disease, and that the commissioners of Charities and Corrections be recommended to take such steps as will enable them to have and control a hospital to be known as the "Consumptive Hospital" to be used for the exclusive treatment of this disease, and that as far as practicable, all inmates of the institutions under their care suffering from tuberculosis be transferred to this hospital; 5, that it be recommended that the disinfecting corps disinfect places where evidence of infection from tuberculosis exists whenever, in the opinion of the chief inspector of contagious diseases, it shall be necessary; and 6, that suitable receptacles (cuspidors) be provided and properly cared for in all places where persons are brought or caused to congregate for any purpose, especially in factories.

According to "The Doctor of Hygiene" for Dec. 20, 1893, the New York City Board of Health has adopted the following resolutions:

> "*Resolved*, That this Board urge upon hospital authorities of the City of New York the importance of separation, so far as possible, in the hospitals of this city, of persons suffering from pulmonary tuberculosis from those affected with other diseases, and urge that proper wards be set apart for the exclusive treatment of this disease; and, be it further
>
> "*Resolved*, That the Commissioners of Charities and Corrections be recommended to take such steps as will enable them to have and control a hospital to be known as 'The Consumptive Hospital,' to be used for the exclusive use of this disease, and that, as far as practicable, all inmates of the institution under their care suffering from tuberculosis be transferred to this hospital."

### *Action by the New York State Board of Health.*

At a meeting of the New York State Board of Health, February, 1894, Doctor Edson, to whom the subject had been referred, made a report stating that "Tuberculosis is a contagious disease, and is distinctly preventable;" that it is acquired by direct transmission, usually by the dried and pulverized sputum floating as dust in the air; and that it can, to a great extent, be prevented by cleanliness and disinfection. Dr. Edson recommended that instructive circulars be distributed; that cases be reported to the local health officers within seven days of the time when the sick persons come under observation, and the health officers should then take the necessary action, visiting the premises, leaving printed instructions. After the death of the patient the room occupied and the premises should be disinfected; and that cuspidors be put in all public places, such as railroad cars, factories, stations, etc. Dr. Edson also recommended that a circular to health officers be sent out stating that local health officers will register the name, address, sex, age of each person suffering from tuberculosis; upon notice of a case, inspectors will visit the premises and family and leave instructive circulars relative to the precautions to be taken; the thorough disinfection of all infected articles; and that the authorities of all public institutions that are under the jurisdiction of the State Board of Health, such as hospitals, asylums, prisons, etc., shall be required to furnish the State Board of Health the name and last address of every consumptive coming under observation within seven days.

The recommendations of Dr. Edson were embodied in a circular which has been issued and distributed by the Board. The disease was recognized as a dangerous communicable disease, and measures were recommended for its prevention and restriction. The circular requests that physicians report each case to the health official of the jurisdiction in which a case occurs.

The New York State Board of Health has also investigated the prevalence of tuberculosis in cattle, and has issued a circular of rules and regulations for inspectors, owners or keepers, and all other persons having charge of cattle suffering from tuberculosis. Dr. Balch, the secretary of the board, writes: "I have to inform you that this department has had in its employ two or more competent veterinarians to examine cattle supposed to be tuberculous, and have examined some 20,000 head either by physical or tuberculin test. Of the number examined some 3 per cent were found to be tuberculous, and were ordered killed. The work however, had been summarily stopped by order of the board."

### *Action by the Philadelphia Board of Health.*

The Sanitary Committee of the Philadelphia Board of Health, to whom was referred the subject of the restriction of tuberculosis, made an elaborate report, and recommended a series of resolutions, which were adopted by the board. The resolutions embrace recommendations that registration be postponed for the present; that circulars containing rules for the prevention of the disease be distributed; that physicians be requested to coöperate with the board in the distribution of these circulars, and to notify the board of cases in which disinfection is required; that a medical inspector visit each house in which a death from tuberculosis has occurred, and satisfy himself that the premises have been disinfected; and that all cases of tuberculosis reported to the Health Bureau be recorded as are cases of other contagious diseases.

The action of the Philadelphia Board is in accordance with the recommendations of the County Medical Society, and in part with the recommendations of the College of Physicians and Surgeons.

### *Action by the Wayne County Medical Society.*

On invitation of the Wayne County Medical Society, the Secretary of this Board read a paper before the meeting of that society in Detroit, Feb. 15, on the subject of "Consumption as a Disease Dangerous to the Public Health." The following resolution was adopted by the society:

"*Resolved*, That hereafter, consumption (and other diseases due to the *Bacillus tuberculosis*) shall be included in the list of diseases of which notice should be given by householders and physicians to the local health boards, as soon as such a disease is recognized."

### *Proposed Action by the Detroit Board of Health.*

The Health Commissioner and one member of the Detroit Board of Health were in attendance at this meeting of the Wayne County Medical Society, and thought that consumption should be reported to the local board, the subject of unsanitary surroundings, damp basements, etc., could then be investigated, as well as such action as is practicable for the restriction of the disease. The Health Commissioner thought it would be practicable for the local board to make bacteriological examinations of sputa of suspected cases, as soon as the new health department building is ready for occupancy.

### *Addresses, Discussions, etc., in Michigan.*

On invitation from the President of the Michigan Agricultural College, your Secretary read a paper in the College Chapel, Friday evening, March 23, before the faculty and students, on the subject: "Our Greatest Danger, and How it may be Avoided"—"The *Bacillus tuberculosis.*" The Secretary has also read a similar paper before the U. and I. Literary Club of Lansing. As is well known to the members of this Board the subject of the restriction and prevention of consumption was discussed at length, and several papers were read at the recent Sanitary Convention under the auspices of this Board at Menominee.

### *Action by the Board of Health of Asbury Park, N. J.*

The Board of Health of Asbury Park, N. J., has declared consumption a communicable disease dangerous to the public health, and requires cases to be reported to the Board of Health, where a record will be made, circulars of information will be issued, and measures will be taken for the restriction of the disease.

### *Action by the Ohio State Board of Health.*

The Secretary of the Ohio State Board of Health has sent out a circular letter, with schedule of seven questions, asking the physicians in Ohio to give their views of the practicability of the State Board of Health taking action for the prevention and restriction of consumption.

### *The Subject Discussed in Florida.*

In a letter dated March 24, Dr. J. L. Horsey, Assistant State Health Officer of Florida, informs the Secretary of the Michigan Board that he had used extracts from Dr. Baker's paper read February 15 before the Wayne County Medical Society, and read a paper on the subject of the Restriction of Consumption before the Florida State Medical Society, at Tampa, March 20 and 21, 1894, and by so doing brought out considerable discussion, which showed the views of the medical profession of Florida on this subject.

### *Proposed Action in California.*

The *Scientific American*, of March 24, contains an article, quoted from the *Southern California Practitioner*, in which it is recommended that California follow the example of Michigan, and officially declare Consumption a Contagious disease, and go one step further and deny consumptives the privilege of engaging in occupations whereby they may endanger the life or health of others.

### *The Subject Discussed in Minnesota.*

The Secretary has recently received from H. Longstreet Taylor, A. M., M. D., of St. Paul, Minn., a copy of his paper on "The Necessity of Special Institutions for the Consumptive Poor. The first step towards a complete eradication of Tuberculosis," in which Dr. Taylor, in a note at the end of his paper, says: "Since writing the above the State of Michigan has, through its efficient Board of Health, put tuberculosis upon the list of contagious diseases that must be reported by the Physician to the health board. This will soon collect a mass of data of the greatest value to the student of the disease in that State, and will, by the limitation of the ravages of the disease in Michigan, soon force the matter to the attention of the other States, and eventually the National Government must take it up."

The movement for the restriction of consumption seems to be a general one, and other boards of health will probably soon take action. The foregoing brief statement has been prepared to show, as far as the Secretary is officially informed, what has recently been done for the restriction of the most important disease—Consumption.

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## THE SMALL-POX IN CHICAGO.

REPORT TO THE MICHIGAN STATE BOARD OF HEALTH, BY ITS DELEGATE TO A MEETING IN CHICAGO CALLED AT ITS INSTANCE BY DR. PROBST, OF OHIO, SECRETARY OF THE NATIONAL CONFERENCE OF STATE BOARDS OF HEALTH.

A conference of representatives of the States immediately around Chicago was held in Chicago May 9 and 10. The alarming increase of small-pox in Chicago and the increasing danger of its spread to contiguous States was the reason for the conference. The State Boards of

Health represented were: Illinois, Indiana, Ohio, Michigan and Wisconsin. The U. S. Marine Hospital Service was represented by J. B. Hamilton, M. D., Ex-Surgeon General. After the conference had nearly perfected its propositions, concerning what in its judgment should be done at once, the Health Commissioner of Chicago came in, and the propositions were again considered by all present. His name was signed with the others to the propositions agreed to as necessary to stop the spread of small-pox in a large city. If the propositions are all promptly enforced in Chicago it is believed that the epidemic will be promptly stopped. It remains to be seen whether or not they will all be enforced. The propositions adopted are as follows:

"1. The city should be divided into districts containing not more than 10,000 people.

"2. Each district should be placed under the supervision of a competent medical inspector with necessary assistants to (a) make a house to house inspection; (b) to successfully vaccinate within the shortest possible time all persons who have not been vaccinated during the outbreak, and that the first vaccination be within seven days; (c) to properly disinfect all houses and their contents where small-pox occurs.

"3. Necessary means and appliances for efficient disinfection of materials, premises, etc., should be provided as the exigencies of each district may require.

"4. Each case of small-pox should be immediately removed to a suitably constructed and properly equipped and officered isolation hospital.

"5. Except in extreme cold weather, hospital tents, as prescribed in the United States Army regulations, floored and warmed, are preferable to the average hospital or private dwelling, and increase the chances of recovery of the patients. Cases of small-pox necessarily detained in their own homes should, with their attendants, be rigidly isolated during the period of danger, and physicians visiting such patients professionally shall be subject to such regulations as may be prescribed by the local health officer.

"6. Persons exposed to small-pox contagion should be immediately vaccinated, or re-vaccinated, and kept under observation for not less than fourteen days from time of last exposure.

"7. It is the sense of this conference that where such measures are *all enforced* it will not be necessary for neighboring cities and States to exclude all persons who come from such city who are not protected against small-pox by vaccination, and to require disinfection of all baggage and merchandise capable of conveying small-pox infection."

The U. S. Marine Hospital Service has instituted a system of inspection of vessels, crews, and passengers leaving Chicago, and vaccination of all crews. A resolution relative to lake ports was adopted by the conference, also one relative to land quarantine, the two being as follows:

"*Resolved*, That no vessel plying on the lakes should be allowed to enter any port within the boundaries of our respective States without having on board, subject to inspection, a Bill of Health, duly signed by an officer of the United States Marine Hospital Service.

"*Resolved*, That in the opinion of this conference strict quarantine by land is unnecessary at present, but the question may well be considered now whether any person from any city where small-pox continues to exist in epidemic form, should be allowed to stop in our States without having a certificate of vaccination within the past three years, and that, in case of establishment of quarantine, all passengers boarding trains should be informed, that unless provided with vaccination certificates from proper authorities, they will be liable to examination, and re-vaccination at the State line."

On the invitation of the Conference, a meeting was called of the clothing and textile-garment manufacturers of Chicago, which meeting appointed a committee to meet the Conference. At that meeting the Conference submitted propositions as follows:

"*Resolved*, That this conference respectfully informs manufacturers of clothing, that owing to the prevalence of small-pox in certain districts of this city, deep apprehension exists in regard to the possible infection of clothing and textile garments made or finished by persons or families living in said districts, some of whom are in close relation with the sick, either in the same house, or having free communication therewith;

"That in view of these facts, we further inform the said manufacturers that under the circumstances, as above set forth, we shall be obliged to recommend to our several State Boards of Health that no clothing, or ladies' dresses or textile garments for sale be allowed to enter, or to be distributed within our respective States except in accordance with the following measures;

"That an efficient daily inspection, with all that such inspection implies, of all places in which such goods are manufactured in the city of Chicago, be established and maintained under the direct supervision of the Illinois State Board of Health, to the end that no such articles from any infected locality shall be put upon the market for sale, or shipment, or be otherwise distributed to the menace of the public health.

"The adoption of the foregoing measure will in our opinion measurably restore confidence, and facilitate trade, but we desire to point out that the continuance of trade will finally depend on efficient general sanitary operations for the suppression of the disease."

The foregoing propositions were accepted by the committee representing the clothing and textile-garment manufacturers. The following day another meeting of the manufacturers was held, when a considerable sum of money was collected, and committees were appointed to collect more, and to see that the measures are carried out.

The State of Illinois has Factory Inspectors to look after conditions affecting the health of employés, and public-health interests. These inspectors are not sufficiently numerous to do the work needed now relative to small-pox; yet they may supply a very well-trained and useful nucleus for that service. The Secretary of the Illinois State Board of Health gave the Conference emphatic assurance that the work agreed to by the Conference and the manufacturers should be faithfully performed; and in the event of its failure to start or of its discontinuance, that he would see that the members of the Conference have prompt notice.

The final results of the Conference are therefore awaited with interest.

Respectfully submitted,
HENRY B. BAKER,
*Delegate.*

OFFICE OF THE MICHIGAN
STATE BOARD OF HEALTH,
*May 15, 1894.*

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## REPORT OF THE SECRETARY RELATIVE TO PROPERTY ETC., FOR THE FISCAL YEAR ENDING JUNE 30, 1894.

*To the President and Members of the Michigan State Board of Health:*

GENTLEMEN:—In compliance with Section 5 of Article II of the by-laws of this Board, the following report of the "Nature and amount of property belonging to the Board, which has been received, issued, expended and destroyed since the last report, and of the property remaining on hand, and also in whose care each item of property is intrusted," is respectfully submitted:

Preceding reports should enable one to learn the items of property on hand at the beginning of the fiscal year 1894. My last report is printed on pages c-cxii, of the Annual Report for 1893. Since last report, instruments and articles of a similar nature have been purchased as follows:

## PHOTO-ENGRAVED PLATES PURCHASED.

One photo-engraved plate—Plan of part of Stanton, Mich.

Two photo-engraved plates—Showing Bacilli and Micrococci of Diseases.

One photo-engraved plate—Annual Deaths in London by Fevers.

One photo-engraved plate—Numbers of Deaths, Births and Paupers per annum in England.

One photo-engraved plate—" Half tone Building " (Michigan State Capitol).

One photo-engraved plate—Typhoid Fever in Michigan in 1890.

One photo-engraved plate—Annual Deaths in London by Consumption.

One photo-engraved plate—Annual Deaths in London by Small-pox.

One photo-engraved plate—Annual Deaths in Sweden by Small-pox.

One photo-engraved plate—Annual Deaths in Foreign Countries before and after the introduction of Vaccination.

One photo-engraved plate—Deaths in London from all causes in periods representing the 17th, 18th and 19th Centuries.

One photo-engraved plate—Deaths in Sweden by all Causes.

One photo-engraved plate—Numbers of Deaths and Births in England, 30 years, 1851-30.

One photo-engraved plate—" Impure source of water, causing Typhoid Fever in Hartford, Michigan.

One photo-engraved plate—Annual Deaths in London by Cholera.

One stereotype plate—Seal of the Office of the Michigan State Board of Health.

Fifteen photo-engraved plates, relating to the meteorological conditions in Michigan in 1891.

Five photo-engraved plates, relating to Weekly Reports of Sickness in Michigan in 1891.

One photo-engraved plate—Reported Deaths from Measles in Michigan, 24 years, 1868-91.

One photo-engraved plate—Localities where Sanitary Conventions have been held in Michigan.

One photo-engraved plate—Map showing distribution of Scarlet Fever in Michigan in 1891.

One photo-engraved plate—Reported Deaths from Scarlet Fever in Michigan, 24 years, 1868-91.

One photo-engraved plate—Measles in Michigan, Cases and Deaths in 1891.

One photo-engraved plate—Outbreak of Diphtheria in Ann Arbor, Michigan, in 1891.

One photo-engraved plate—Reported Deaths from Diphtheria in Michigan, 24 years, 1868-91.

One photo-engraved plate—Map, Distribution of Diphtheria in Michigan in 1891.

One photo-engraved plate—Diphtheria, Cases and Deaths, in Michigan in 1891.

## PROPERTY LOANED.

Six photo-engraved plates showing relation of certain meteorological conditions to diseases of the lungs and Air-passages were loaned to John Bornman & Son, printers, Detroit, Michigan (by request of Charles W. Hitchcock, M. D., President of the State Medical Society).

Many plates were loaned to Robert Smith & Co., State Printers and Binders, Lansing, to be used in printing Annual Reports and other publications of this Board. Most of these plates have been returned, but a few still remain charged to them on the property loan book of this Office. The plates will probably be returned as soon as the State Printer is through using them.

## PROPERTY RETURNED.

Six photo-engraved plates—Diagrams showing relation of certain meteorological conditions to diseases of the lungs and Air-passages were returned by A. N. Bell, M. D., Editor of the " Sanitarian," Brooklyn, N. Y.

## METEOROLOGICAL INSTRUMENTS, ETC., PURCHASED.

Three maximum registering thermometers.

Two dry-bulb thermometers.

Two galvanized iron pails for measuring snowfall.

One observing box for barometer.

One skein psychrometer wicking.

One magnifying hand glass.

### METEOROLOGICAL INSTRUMENTS ISSUED.

Meteorological instruments have been intrusted to observers for State Board of Health as follows.

To Michigan State Board of Health, Lansing:—One galvanized iron pail for measuring depth of snowfall.

To J. M. Conant, M. D., Tawas City, Michigan—One barometer with hook and box; one dry bulb thermometer, with board and clips; one wet bulb thermometer, with cup and wick; one maximum registering thermometer, with screw-bolt and pin; one minimum registering thermometer, with board and clips; one rain gauge; one measuring stick for rain gauge.

To C. C. Tefft, Tecumseh, Michigan:—One maximum registering thermometer.

To C. E. Beers, Adrian, Michigan:—One barometer with hook and box; one dry bulb thermometer, with board and clips; one wet bulb thermometer, with cup and wick; one maximum registering thermometer with screw-bolt and pin; one minimum registering thermometer with board and clips.

To D. W. Mitchell, M. D., Harrisville, Michigan:—One barometer; one wet bulb thermometer; one psychrometer cup.

### METEOROLOGICAL INSTRUMENTS ACCIDENTALLY BROKEN WHILE IN USE BY OBSERVERS.

One maximum thermometer, returned, broken, by C. C. Tefft, Adrian.

One wet bulb; one barometer, returned, broken,* by D. W. Mitchell, M. D., Harrisville.

One dry bulb; one wet bulb; one overflow tube to rain gauge; one measuring stick for rain gauge; one minimum thermometer, by Geo. H. Greene, M. D., Marshall.

### METEOROLOGICAL INSTRUMENTS RETURNED.

One barometer; one maximum registering thermometer with screw-bolt and pin; one wet bulb; one rain gauge, by Geo. H. Greene, M. D., Marshall.

### METEOROLOGICAL INSTRUMENTS AND OTHER PROPERTY ON HAND.

2 standard barometers (including one in use at this office).
10 dry bulb thermometers (including one in use at this office).
5 wet bulb thermometers (including one in use at this office).
4 minimum registering thermometers (including one in use at this office).
3 maximum registering thermometers (including one in use at this office).
1 standard thermometer.
1 standard thermometer for inspecting oils.
3 registering thermometer boards (including one in use at this office).
7 psychrometer boards (including one in use at this office).
1 psychrometer cup in use at this office.
9 minimum thermometer clips.
5 wet bulb clips.
6 screw bolts for registering thermometers.
7 pins for registering thermometers.
1 hook for hanging barometer.
2 barometer boxes (including one in use at this office).
2 rain gauges (including one in use at this office).
1 basin for rain gauge.
2 caps for overflow tubes to rain gauges.
2 large galvanized iron pails to measure snowfall.
1 Draper's self-registering thermometer.
1 Anemometer, complete, in use at this office.
2 Circular magnifying hand glasses.
3 minimum thermometers and 2 maximum thermometers spoiled by exposure and long use.
3 psychometer cups, spoiled by rust and long exposure.
8 psychometer cups, injured by use; can be repaired.
24 broken thermometers. (Includes all since observations have been taken.)
1 worn-out anemometer spindle.
300 sheets ozone test-paper.

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* Repaired and returned to this office by Henry J. Green, N. Y.

## ACCESSIONS TO THE LIBRARY.

Books and other publications have been received and placed in the library of the Board, during the fiscal year ending June 30, 1894, as follows:—

By Gift, Exchange, etc. (Names and addresses of donors are printed in italics.)

*Abbott, Dr. Samuel W., Secretary, Boston, Mass.:*
Manual for use of Local Boards of Health in Massachusetts, giving Laws relating to the Public Health.
Annual Report of the Massachusetts State Board of Health, 1892.
Water Supply and Sewerage of Massachusetts.

*Armstrong, Dr. George S., Secretary Olympia, Wash.:*
2d Annual Report of the State Board of Health of Washington, year ending Sept. 30, 1893.

*Baker, Dr. Henry B., Secretary, Lansing, Mich :*
The Restriction of Diphtheria in Holland, Michigan. Reprint No. 396.
A Study of the Action of Alcohol on the Human Body. Reprint No. 394.
19th Annual Report of the Michigan State Board of Health, 1891.
Reprint No. 371.—"The Time of Greatest Prevalence of Each Disease in Michigan, in 1890."
Proceedings of Sanitary Convention at Hillsdale, July, 1893.
Proceedings of the Sanitary Convention at Stanton, Michigan, April, 1893.
Reprint No. 400.—"Communicable Diseases in Michigan in 1891."
Reprint No. 372.—Communicable Diseases in Michigan in 1890.
Scarlet Fever in Michigan in 1890.
Consumption as a Disease Dangerous to the Public Health.
Achievements of Sanitation. Reprint No. 388.
The present Comparative Immunity of Adults from Diphtheria. Reprint No. 389.

*Baker, Dr. L. J., City Physician, Ottumwa, Iowa:*
1st Annual Report of the Board of Health of the City of Ottumwa, Iowa, Year ending March 1, 1894.

*Balch, Dr. Lewis, Secretary, Albany, N. Y.:*
13th Annual Report of the New York State Board of Health, 1893.
Maps accompanying the 13th Annual Report of the New York State Board of Health.
12th Annual Report of the New York State Board of Health, 1892.
Local Boards of Health in the State of New York.

*Becchi, F., Director-General of the Army, Rome, Italy:*
Della Leva Sui Giovani nati nell' anno 1871 delle Vicende del R. Esercito Dal 1 Luglio al 30 Giugno 1892.

*Beitler, A. M., Director, Philadelphia, Penn.:*
The Ounce of Prevention. Department of Public Health and Safety.

*Billings, M. D., John S., Washington, D. C.:*
Catalogue of Exhibits in the Museum of Hygiene, Medical Department of the U. S. Army.
Vital Statistics of the District of Columbia and Baltimore, six years ending May 31, 1890.

*Billings, Hon. S. R., Commissioner, Lansing, Mich.:*
Report of the Commissioner of Railroads of Michigan, 1893.

*Bliss, Richard, Librarian, Newport, R. I.:*
163d Annual Meeting of the Board of Directors of the Redwood Library, Newport, R. I., Aug., 1893.

*Board of Health, Cambridge, Mass.:*
Annual Report of the City Board of Health, Cambridge, Mass., year ending Nov. 30, 1893.

*Board of Health, Mobile, Ala.:*
Annual Report of the Board of Health, of the city of Mobile, Ala., for the year 1892.
Annual Report of the Mobile Board of Health, 1893.

*Board of Health, Norristown, Pa.:*
Rules and Regulations of the Board of Health, Norristown, Pa., 1894.

*Board of Health, Manchester, N. H.:*
Regulations for the Plumbing and Draining of Buildings.
Annual Report of the Manchester Board of Health, 1893.

*Board of Health, Nashville, Tenn.:*
19th Annual Report of the Board of Health, Nashville, Tenn., 1893.

*Board of Health, New Bedford, Mass.:*
14th Annual Report of the Board of Health, New Bedford, Mass., 1892.

*Board of Health, Oakland, Cal.:*
Annual Report of the Oakland Board of Health, year ending June 30, 1893.

*Board of Health, Portland, Me.:*
8th Annual Report of the Board of Health, Portland, Maine, year ending Feb. 28, 1893.

*Board of Health, Reading, Pa :*
Annual Report of the Board of Health of the City of Reading, Penn., for the year 1892.

*Board of Health, Winona, Minn.:*
Annual Report of the Board of Health of Winona, Minn., year ending March 31, 1894.

*Bockh, Prof. R., Director, Berlin, Germany:*
Statistiches Jahrbuch der Stadt Berlin, 1891.

*Bureau of Education, Washington, D. C.:*
Hand-Book of University Extension. Second Edition.
Report of Committee on Secondary School Studies.
The History of Education in Delaware.
The Spelling Reform.
Statistics of Public Libraries in the United States.
Statistics of Public Libraries in the United States and Canada.
Report of the Commissioner of Education, 1889–90, Vol. I.
Report of the Commissioner of Education, 1889–90, Vol. II.
Report of the Commissioner of Education, 1887–88.
Catalog of "A. L. A." Library.

*Bureau of Hygiene, Havre, France:*

Report of the Bureau of Municipal Hygiene for the period 1880–1889.

*Bureau of Labor, Washington, D. C.:*

8th Annual Report of the Commissioner of Labor, 1892.

*Bureau of Public Health, Christiania, Norway:*

Beretning om Folkemaengden og Sundhedstilstanden i Christiania, 1892.

*Bureau of Statistics, Rome, Italy:*

Cause de Morti, Statistica degli anni 1891 e 1892.

Notizie sulle Condizioni Demografiche Edilize ed Administrative di Alcune Grandi Citta Italiane ed Estere nel 1891.

*Bureau of Statistics, Washington, D. C.:*

Statistical Abstract of the U. S., 1893.

Vagrancy and Public Charities in Foreign Countries.

Immigration and Passenger Movement at Ports of U. S., year ending June 30, 1893.

Commerce and Navigation of U. S., 1893.

Quarterly Report of Chief of Bureau of Statistics, relative to Imports and Exports of the U. S., Quarter ending June 30, 1893.

Summary Statement of Imports and Exports of the U. S., July, 1893.

*Browne, Dr. John S., Librarian, New York City:*

Transactions of the New York Academy of Medicine, Vol. IX.

*Bryce, Dr. Peter H., Secretary, Toronto, Ont.:*

Report on Tuberculosis in Ontario, 1893.

11th Annual Report of the Provincial Board of Health of Ontario.

*Burrows, Dr. J. G., Secretary, Melbourne, Australia:*

18th Annual Report of the Australian Health Society, 1892–93.

The Toilet, or the Care of the Skin, Hair, Nails and Teeth.

*Cahill, Dr. George S., City Physician, Burlington, Vt.:*

Annual Report of the Health Physician of Burlington, Vermont, 1893.

*Cantwell, Dr. A. W., Secretary, Davenport, Iowa:*

Proceedings of the Davenport Academy of Natural Sciences, Vol. 5, Part III.

Annual Report of the City Officers of Davenport, Iowa, year ending March 1, 1893.

*Cattermole, Dr. George H., Point Levis, Quebec:*

Quarantine Regulations for the Dominion of Canada—June 20, 1893.

*Carpmael, Prof. Charles, Director, Ottawa, Canada:*

Report of the Meteorological Service of the Dominion of Canada, 1889.

*Celli, Prof. Algelo, Director, Rome, Italy:*

L'Azione dell Suolo sui Gerari del Carbonchio.

Contributo allo Studio della Tossicita della Spirillo Colerigeno.

Nuovo Methodo di Anolisi delle Materie Coloranti Artificiali Derivate dal Catrame.

Sulle Funzoni Reciproche del Solli Inorganici nella Ivanzione Minerale e nelle Malattie Consumptive.

*Chalmers, Dr. Archie K., Medical Officer of Health, Glasgow, Scotland:*

Scarlatina and Scarlatinal Sore Throat. A Report of Milk Inspection.

*Chapin, Dr. Charles V., Supt. of Health, Providence, R. I.:*

38th Annual Report upon Births, Marriages, and Deaths, city of Providence, R. I., year 1892.

10th Annual Report of the Supt. of Health, city of Providence, year 1892.

*Cheesman, Dr. Timothy, M., New York City:*

A Consideration on Artesion Wells and Surface Waters from the Standpoint of Bacteriology and Public Health.

A report of a recent Sanitary Inspection of one of the Sources of the Croton Water-Supply.

*Chipman, Willis, Civil Engineer, Toronto, Ont.:*

How to do it. Some Suggestions on House Sanitation.

Report on the Proposed System of Sewerage of Lindsay, Ontario.

*Civil Service Commission, Washington, D. C.:*

9th Annual Report of the U. S. Civil Service Commission, July 1, 1891, to June 30, 1892.

*Clapp, Dr. E. P., Health Officer, Evanston, Ill.:*

Revised Ordinances of the City of Evanston, Ill.

*College of Physicians, Philadelphia, Penn.:*

Transactions of the College of Physicians of Philadelphia, Third Series, Vol. 15.

*Commissioner of Labor, Washington, D. C.:*

7th Annual Report of the U. S. Commissioner of Labor, 1891, Vol. 2.

*Conger, Norman B., Inspector, Detroit, Mich.:*

Report on the Forecasting of Thunderstorms during the summer, 1892.

*Coulthard, Dr. George E., Secretary, St. Johns, N. B.:*

7th Annual Report of the Provincial Board of Health of New Brunswick, year 1893.

*Decoud, Dr. D., Buenos Ayres, Argentine Republic:*

Les Institutions Sanitaires dans La Republique Argentine.

*Denza, P. Francois, Rome, Italy:*

Publicazioni della Specola Vaticana.

*Dewey, Melvil, State Librarian, Albany, N. Y.:*

N. Y. State Library Bulletin, Legislation No. 4.

*Dixon Sanitary Co., Finlay, Ohio:*

The Problem Solved—Disposal of Garbage, etc.

*Dowling, Thomas J., Commissioner, Albany, N. Y.:*

Bureau of Statistics of Labor of the State of New York, Vol. 1, 1891.

Bureau of Statistics of Labor of the State of New York, Vol. II, 1891.

Bureau of Statistics of Labor of the State of New York, Vol. I, 1892.

Bureau of Statistics of Labor of the State of New York, Vol. II, 1892.

*Dryden, Miss Minta, Librarian, Dayton, Ohio:*

Report of the Dayton Free Public Library and Museum, 1892-1893.

*Dykes, Dr. Henry A., Secretary, Topeka, Kansas:*
9th Annual Report of the Kansas State Board of Health, 1893.

*Ellis, Hon. A. A., Attorney General, Lansing, Michigan:*
Report of the Attorney General of the State of Michigan for the year ending June 30, 1893.

*Ferguson, Dr. E. D., Secretary, Troy, N. Y.:*
Transactions of the New York Medical Association, 1893.

*Finley, John P., Washington, D. C.:*
Certain Climatic Features of the Two Dakotas.

*Foster, Dr. Eugene, President, Augusta, Ga.:*
16th Annual Report of the Augusta Board of Health, 1893.

*Foster, William E., Librarian, Providence, R. I.:*
7th Annual Report of the Public Library, year 1893.

*Frazer, Dr. E. B., Secretary, Wilmington, Del.:*
7th Biennial Report of the Delaware State Board of Health, 1890-92.

*Giddings, Hon. Theron F., Commissioner, Lansing, Michigan:*
Insurance Bureau—Summary in advance of the Annual Report, showing financial condition and Michigan Business, year 1893.

*Goss, Dr. Francis W., Secretary, Roxbury, Mass.:*
Medical Communications of the Mass. State Medical Society, 1893.

*Grimshaw, Thomas, Registrar-General, Dublin, Ireland:*
29th Report of the Registrar-General of Ireland, relative to Births, Marriages and Deaths, year 1892.

*Hambitzer, Joseph F., State Treasurer, Lansing, Mich.:*
Report of the Treasurer of the State of Michigan, 1893.

*Harrington, Prof. Mark W., Chief, Washington, D. C.:*
Report of the Chief of the U. S. Weather Bureau, 1891-1892.
Report of the Chief of the U. S. Weather Bureau, year 1892.

*Harcourt, Richard, Registrar-General, Toronto, Ont.:*
Report relating to the Registration of Births, Marriages, and Deaths in the Providence of Ontario, 1891.

*Hartwell, Dr. E. M., Boston, Mass.:*
The Principal Types of Physical Training Compared.
Physical Training Treated from an American and European Point of View.
Proceedings of the Physical Training Conference, 1889.
On the Physiology of Exercise.
Some Aspects of Athletics and Gymnastics at Home and Abroad.
Addresses Delivered at the 7th Annual Meeting of the American Association for the Advancement of Physical Training, Philadelphia, April, 1892.

*Hazen, Prof. Henry A., Washington, D. C.:*
The Climate of Chicago. Bulletin No. 10, U. S. Weather Bureau.

*Hawley, Dr. D. C., Secretary, Burlington, Vt.:*
Transactions of the Vermont State Medical Society, 1894.

*Herrick, Dr. S. S., San Francisco, Cal.:*
11th Biennial Report of the California State Board of Health, year ending June 30, 1890.

*Hitchcock, Dr. C. W., Secretary, Detroit, Michigan:*
Transactions of the Michigan State Medical Society, year 1893.

*Holt, Dr. Joseph, New Orleans, La.:*
The New Orleans Sewerage System.

*Huff, Dr. O. N., Chicago, Ill.:*
A Consideration of the Cause of Typhoid Fever in Chicago.

*Hunt, Dr. Ezra M., Secretary, Trenton, N. J.:*
8th Annual Report of the New Jersey State Board of Health, 1884.
10th Annual Report of the New Jersey State Board of Health, 1886.
14th Annual Report of the New Jersey State Board of Health, 1890.
15th Annual Report of the New Jersey State Board of Health, 1891.
Annual Report of the New Jersey Board of Health, year 1893.

*Imperial Bureau of Statistics, Berlin, Germany:*
Statitisches Jahrbuck für das Deutsches Reich, 1893.

*Ingersoll, Prof. C. L., Director, Lincoln, Neb.:*
The Influence of Changes of Food and Temperature on the Quantity and Quality of the Milk of Dairy Cows—Bulletin No. 30, Experiment Station, University of Nebraska.
7th Annual Report of the Nebraska Agricultural Experiment Station, 1893.

*Jordan, Dr. J. R., Secretary, Montgomery, Ala.:*
Transactions of the Alabama State Medical Association, 1893.
The Report of the Board of Health of the State of Alabama, 1892.

*Kimball, Hon. Sumner I., Gen. Supt., Washington, D. C.:*
Annual Report of the U. S. Life Saving Service for fiscal year ending Jan. 30, 1891.

*Kobayashi, Prof. K., Director, Tokio, Japan:*
Annual Report of the Central Meteorological Observatory, 1891, Part 2.
Annual Report of the Central Meteorological Observatory, 1892, Part 1.
Annual Report of the Central Meteorological Observatory of Japan for the year 1891—Part I.

*Laberge, Dr. Louis, Health Officer, Montreal, Quebec:*
Report of the Sanitary State of Montreal, 1892.

*Lee, Dr. Benjamin, Secretary, Philadelphia, Penn.:*

Proceedings of the National Conference of State Boards of Health, Lansing, June, 1892.
8th Annual Report of the Pennsylvania State Board of Health, 1892.
7th Annual Report of the Pennsylvania State Board of Health, 1891.
Regulations of the State Quarantine Board of Penn., adopted June 19, 1893.
Rules for the Government of the State Quarantine Board of Pennsylvania, 1893.
Proceedings and Papers of the National Conference of State and Provincial Boards of Health, Lansing, June, 1892.
Proceedings of the 6th Sanitary Convention, at Erie, Penn., March, 1892.
Personal Precautions Recommended to be taken by Attending Physicians in Cases of Communicable Diseases.—Circular No. 41.
How to Meet Cholera.—Circular No. 42.
Precautions against Small-pox.—Circular No. 8.
The Law Establishing Boards of Health in Boroughs in Penn.
Emergency Hospitals.—Circutar No. 37.

*Life-Saving Commission, Washington, D. C.:*

Annual Report of the U. S. Life-Saving Service, year ending June 30, 1892.

*Lindsley, Dr. Charles A., Secretary, New Haven, Conn.:*

Annual Report of Connecticut State Board of Health, 1893.
Alphabetical List of the Medical Practitioners in Connecticut, 1893.

*Local Government Board, London, England:*

21st Annual Report of the Local Government Board of England, 1891-92, with supplement containing the Report of the Medical Officer, year 1891.

*McLean, Dr. John T., Health Officer, Alameda, Cal.:*

1st Annual Report of the Board of Health of Alameda, Cal., 1888.

*McLeod, Dr. Duncan, Health Commissioner, Detroit, Mich.:*

Report of the Board of Health for the last four months of 1893.

*McMillan, Hon. Neal, State Oil Inspector, Rockford, Mich.:*

Report of the State Inspector of Illuminating Oils of the State of Michigan for the year 1893.

*McShane, Dr. James F., Health Commissioner, Baltimore, Md.:*

Annual Report of the Health Department of Baltimore, Maryland, 1893.

*Marchand, P. A., Librarian, Cincinnati, Ohio:*

83d Annual Report of the Cincinnati Hospital, 1893.

*Maryland Weather Service, Baltimore, Md.:*

The Climatology and Physical Features of Maryland, 1892-1893.

*Mead, Daniel W., Civil Engineer, Rockford, Ill.:*

The Geology of Wisconsin Water Supplies.
Notes on the Hydro-Geology of Illinois in relation to its Water-Supplies.

*Means, Dr. T. A., Secretary, Mobile, Ala.:*

Report of the State Board of Health of Alabama, year 1890.
Report of the State Board of Health of Alabama, year 1891.

*Mendenhall, T. C., Supt., Washington, D. C.:*

Report of the Supt. of the U. S. Coast and Geodetic Survey, fiscal year ending June 30, 1891, Part 2.

*Metcalf, Dr. C. N., Secretary, Indianapolis, Ind.:*

11th Annual Report of the Indiana State Board of Health, fiscal year ending Oct. 31, 1892.

*Montizambert, Dr. Frederick, Supt. of Quarantine, Quebec, Can.:*

Report on the St. Lawrence Quarantine System, year 1893.

*Morize, Mr. H., Director, Rio de Janerio, Brazil:*

Annuario Publicado Pelo Observatorio do Rio de Janerio, Anno 1893.

*Morse, Dr. Edward S., Salem, Mass.:*

Latrines of the East.

*Morse, Col. W. F., New York City:*

Disposal of the Garbage and Waste at the World's Fair.

*Nagel, A., Director, Dresden, Saxony:*

Kalendar und Statistisches Jahrbuch für das Knoigreisch Sachsen, aus das Jahr 1894.

*North, Dr. S. W., Medical Officer, York, Ireland:*

Report on the Health of York, Ireland, in the year 1891 and 1892.

*Pagliani, Prof. L., Director Bureau of Sanitation, Rome, Italy:*

La Legislazioni et L'Administration Sanitaire im Itali et les Institutions Scientifiques.
Relazione intomo All 'Epidemia di Cholera in Italia nell 'anno 1893.
Guide des Thermes et Bains D'Italie.

*Pecham, Hon. C. H., Secretary Howard, R. I.:*

25th Annual Report of the Board of Corrections and Charities of the State of Rhode Island, 1893.

*Pope, Col. A. A., Boston, Mass.:*

Errors in School Books, Second Edition.

*Prendergast, Dr. J. W., Health Officer, Cincinnati, Ohio:*

Annual Report of the Health Department of the City of Cincinnati, Ohio, year 1892.

*Probst, Dr. C. O., Secretary, Columbus, Ohio:*

Proceedings of the National Conference of State Boards of Health, 8th Annual Meeting, New York City, April, 1893.
Report of the Ohio State Board of Health, 1892.

*Reeve, Dr. J. T., Secretary, Appleton, Wis.:*

Bienniel Report of the State Board of Health of Wisconsin, 1891-92.

*Reed, Dr. R. Harvey, Commissioner, Mansfield, Ohio:*

Annual Report of the Health Department of Mansfield, Ohio, 1892-3.

*Reynolds Library, Rochester, N. Y.:*

7th Annual Report of the Trustees of the Reynolds Library at Rochester, N. Y., year 1892.

*Reynolds, Dr. Arthur R., Health Cammissioner, Chicago, Ill.:*

The Water Supply of Chicago, its Sources and Sanitary Aspects.

*Robinson, Dr. D. W., Pierre, Dakota:*

A Climatic Sketch—Dakota for Health Seakers.

*Robinson, Dr. John. W., Toronto, Cnt.:*

26th Annual Report on Asylums for the Insane of Ontario, 1893.

*Rohé, Dr. George H., Medical Supt., Catonsville, Md.:*

Annual Report of the Board of Managers of Maryland Hospital for Insane, Nov., 1893.

*Russell, Dr. James R., Glasgow, Scotland:*

Laboratory Reports of the Royal College of Physicians, Edinburg, Scotland, Vol. IV.

*St. Louis Public Library:*

Annual Report of the St. Louis (Mo.) Public Library, 1891-92.

*Salmon, Dr. D. A., Chief, Washington, D. C.:*

Report of Bureau of Animal Industry, 1891-1892.

*Scott, Dr. James W., Secretary, Springfield, Ill.:*

Annual Report of the Illinois State Board of Health for the years 1889, 1890, and 1891.

*Secretary of Agriculture, Washington, D. C.:*

Nostrums for Increasing the Yield of Butter, Bulletin No. 12.
The Pollination of Peach Flowers.
Record of Experiments with Sorghum in 1893.
Foods and Food Adulterants. Bulletin No. 13, Division of Chemistry.
A Revision of the Adult Cestodes of Cattle, Sheep, and Allied Animals.

*Secretary of State, Columbus, Ohio:*

Annual Report of the Secretary of State of Ohio, relative to Vital Statistics, year 1874.

*Secretary of State, Lansing, Michigan:*

Senate Journal, 1891, Vol. 1.
Senate Journal, 1891, Vol. 2.
House Journal, 1891, Vol. 1.
House Journal, 1891, Vol. 2.
House Journal, 1891, Vol. 3.
Local Acts of 1893.
Michigan and its Resources, 1893.

*Secretary of State, Washington, D. C.:*

Summary Statement of Imports and Exports for August, 1893.
Quarterly Report of Bureau of Statistics relative to Imports, Exports, etc., for the quarters ending March 31, June 30, Sept. 30, and Dec. 31, 1893.
Commercial Relations of the United States with Foreign Countries during the years 1891-1892.
Principal Exports of the U. S. declared by the Several Consulates.
Report from the Consuls of the U. S., July, Aug., Sept., Oct., Nov., Dec., 1893, and Jan., Feb., March, April, May, June, 1894.

*Sewall, Dr. Henry, Secretary, Denver, Col.:*

Laws relating to the Public Health passed in the Ninth General Assembly of the State of Colorado.

*Seward, F. D., Secretary, St. Louis, Mo.:*

Proceedings of 10th Annual Conference of Confectioners in the U. S., July, 1892.

*Shedd, J. H., City Engineer, Providence, R. I.:*

Annual Report of the City Engineer of the City of Providence, R. I., year 1892.

*Sheldon, Dr. C. S., Secretary, Madison, Wis.:*

Transactions of the Wis. Medical Society, 1893.

*Sherwood, Hon. T. C., Commissioner, Lansing, Mich.:*

Report of the Commissioner of Banking, 1893.

*Simmerman, C. H., Chief of Bureau, Trenton, N. J.:*

Report of the Bureau of Statistics of New Jersey, 1892.

*Simpson, Dr. William J., Calcutta, India:*

Report of the Health Officer of Calcutta, for year 1892.

*Smith, Dr. Charles D., Secretary, Portland, Maine:*

Transactions of the Maine State Medical Society, 1893, Vol. II, Part 2.

*Smith, Erwin F., Washington, D.C.:*

Experiments with Fertilizers for the Prevention and Cure of Peach Yellows, 1889-92.

*Smithsonian Institution, Washington, D. C.:*

Smithsonian Report, 1892.
Smithsonian Report, 1891.

*Smock, John C., State Geologist, Trenton, N. J.:*

Annual Report of the Geologist of the State of New Jersey, 1892.

*Snellen, Maurito, Director, Utrecht, Netherlands:*

Report of the Royal Meteorological Institute of Netherlands, year 1892.

*Somers, Dr. A. B., Commissioner, Omaha, Neb.:*

6th Annual Report of the Board of Health of Omaha, year 1893.

*Stewart, Dr. James R., Secretary, Baltimore, Md.:*

10th Annual Report of the Maryland State Board of Health, two years ending Dec. 31, 1893.

*Storrs, Hon. L. C., Secretary, Lansing, Michigan:*

Proceedings of the 12th Annual Conference of Board of Correction and Charities in Michigan, at Muskegon, Dec., 1893.

*Strong, Chauncey, City Clerk, Kalamazoo, Michigan:*

Annual Report of the City of Kalamazoo, year ending March 31, 1893.

*Strong, Doctor J., Health Officer, Cleveland, Ohio:*

20th Annual Report of the Health Division, Department of Police, Cleveland, Ohio, year 1892.

*Surgeon General, U. S. A., Washington, D. C.:*

Index Catalogue of the Library of the office of the U. S. Surgeon General of the U. S. Army, Vol. 14.

*Taneyhill, Dr. G. Lane, Secretary, Baltimore, Md.:*

Transactions of the Medical and Chirurgical Faculty of State of Maryland, 94th Annual Meeting, April, 1892.
Transactions of the Medical and Chirurgical Faculty of the State of Maryland, 95th Session, April, 1893.

*Taylor, Dr. H. L., St. Paul. Minn.:*

The Necessity of Special Institutions for Consumptive Poor.

*Taylor, Dr. Thomas, Chief, Washington, D. C.:*

Report of the Microcopist for 1892.

Food Products—I—Twelve Edible Mushrooms in U. S.

Food Products—II—Eight Edible Mushrooms in U. S.

Food Products—III—Mushroom Culture.

*Thom, Dr. William A., Norfolk, Va.:*

Some letters on Quarantine.

*Thornton, Dr. George B., President, Memphis, Tenn.:*

15th Annual Report of the Board of Health, city of Memphis, Tenn., year 1893.

*Tucker, Prof. Willis G., Director, Albany, N. Y.:*

Report of Willis G. Tucker, M. D., Director of State Chemical Laboratory. Extract of Annual Report of the State Board of Health of New York, 1891.

Report of Willis G. Tucker, M. D., Director of State Chemical Laboratory. Extract from Annual Report of State Board of Health of the State of New York, 1892.

Association of the Alumni of the Albany Medical College. Proceedings of the 20th annual meeting, April 26, 1893.

*Veeder, Dr. M. A., Lyons, N. Y.:*

Solar Electro-Magnetic Induction.

Thunderstorms.

*Venable, F. P., Chapel Hill, N. C.:*

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*Wadlin, Horace, Chief, Boston, Mass.:*

The Annual Statistics of Manufactures in Massachusetts, 1892.

23d Annual Report of the Bureau of Statistics of Labor, State of Massachusetts, March, 1893.

*Waring, Jr., George E., Civil and Sanitary Engineer, Newport, R. I.:*

Report of the Condition of Sewers of Memphis, Tenn., March 4, 1893.

The Memphis System of Sewerage at Memphis and Elsewhere.

*West, Dr. H. A., Secretary, Galveston, Texas:*

Transactions of State Medical Society of Texas, Galveston, 1893.

*Wilbur, Dr. C. L., Chief, Lansing, Michigan:*

25th Registration Report, of Vital Statistics, in Michigan, 1891.

*Wingate, Doctor U. O. B., Health Commissioner, Milwaukee, Wis.:*

5th Annual Report of the Commissioner of Health of Milwaukee, April, 1893.

*Wood, Dr. E. M., Secretary, Winnipeg, Manitoba:*

An Act Respecting the Public Health of Manitoba.

*Wright, Dr. Frank W., Health Officer, New Haven, Conn.:*

Annual Report of the New Haven Board of Health, year 1892.

*Wyman, Dr. Walter, Surgeon-General, U. S. M. H. S., Washington, D. C.:*

Quarantine Rules and Regulations of the U. S., April, 1894.

Weekly Abstracts of Sanitary Reports to the U. S. Marine Hospital Service, Washington, D. C., Vol. 5, 1890.

Weekly Abstracts of Sanitary Reports to the U. S. Marine Hospital Service, Vol. 6, 1891.

Weekly Abstracts of the Sanitary Reports of the U. S. Marine Hospital Service, Washington, D. C., Vol. 7, 1893.

Weekly Abstracts of Sanitary Reports to the U. S. Marine Hospital Service, Vol. 8, 1893.

## ACCESSIONS BY PURCHASE.

Annual Report of the Sanitary Commissioner, with the Government of India, 1891. (Postage only.)

Further Reports and Papers on Epidemic Influenza, 1889-92.

Transactions of the Sanitary Institute of Great Britain, Vol. 13.

Andrew J. Graham's Standard Phonetic Dictionary.

Vagaries of Sanitary Science—Dibble.

Cholera: Its Causes, Symptoms, Pathology and Treatment.

Gray's Descriptive and Surgical Anatomy, 13th Edition.

Modern Meteorology—Waldo.

Outlines of Practical Hygiene—Currier.

The Hygienic Prevention of Consumption—Squire.

Sewage Disposal in the United States, Rafter and Baker.

The Suppression of Consumption—Hambleton.

Foster's Encyclopædic Medical Dictionary. Vol. 4.

International Congress of Charities, Chicago, 1893.

International Congress of Charities, Chicago, 1893, Hospital Volume.

Handbook of Public Health and Demography—Willoughby.

Methods of Practical Hygiene—Lehmann. Two Vols.

53d Annual Report of the Registrar-General of England.

A Treatise on Hygiene and Public Health—Stevenson and Murphy.

Elementary Meteorology—Davis.

Statistical Atlas of the United States—Hewes and Gannett.

21st Annual Report of the Local Government Board of England.

22d Annual Report of the Local Government Board of England.

American Lancet—Detroit.

Scientific American and Supplement—New York.

U. S. Postal Guide.

American Journal of Medical Sciences—Philadelphia.

Medical News, Philadelphia.

Popular Science Monthly—New York.

London Lancet.

Nature.

British Medical Journal—London.

Sanitarian—Brooklyn.

American Meteorological—Boston.

Sanitary Record—London.

Sanitary Journal—Glasgow.

Centralblatt für Bakteriologie und Parasitenkunde—Berlin.

Science—New York.

Jour. American Medical Assoc.—Chicago.

## ACCESSIONS BY EXCHANGE.

Received in exchange for publications of this Board (in some instances incomplete volumes):

U. S. Abstracts of Sanitary Reports, Washington.
American Exchange and Review, Philadelphia.
American Analyst, New York.
American Practitioner and News, Louisville, Ky.
Annals of Hygiene, Philadelphia.
Architecture and Building, New York.
Buffalo Medical and Surgical.
Brooklyn Medical Journal.
Bulletin of the Cornell University, Ithaca.
Bulletin Iowa State Board of Health, Des Moines.
Bulletin North Carolina State Board of Health, Wilmington.
Bulletin Rhode Island State Board of Health, Providence.
Bulletin Tenn. State Board of Health, Nashville.
Bulletin Florida State Board of Health, Jacksonville.
Bulletin Ohio State Board of Health, Columbus.
Bulletin Maine State Board of Health, Augusta.
Canada Educational Monthly, Toronto.
Canada Lancet, Toronto.
Canadian Practitioner, Toronto.
Cleveland Medical Gazette.
College and Clinical Record, Philadelphia.
Columbus Medical Journal.
Confectioner's Journal, Philadelphia.
Clinical Review, Chicago.
Dietetic Gazette, New York.
Doctor of Hygiene, New York.
Good Health, Battle Creek, Mich.
Indicator, Detroit.
Jour. Comparative Med. and Vet. Archives, New York.
Jour. Franklin Institute, Philadelphia.
Lehigh Valley Medical Journal, Easton.
Leonard's Illustrated Medical Monthly, Detroit.
Medical Age, Detroit.
Medical Brief.
Medical Bulletin, Philadelphia.
Medical Examiner, New York.
Medical and Surgical Reporter, Philadelphia.
Manufacturer and Builder, New York.
Maryland Medical Journal, Baltimore.
Memphis Medical Journal.
Metal Worker, New York.
National Druggist, St. Louis.
Nashville Medical and Surgical Journal.
North Carolina Medical Journal, Wilmington.
National Popular Review, San Diego, Cal.
Physician and Surgeon, Detroit.
Public Health in Minn., Red Wing.
Quarterly Returns of Births and Deaths of Dublin, Ireland.
Quarterly Royal Meteorological Journal, London.
Semana Medica, Buenos Ayres, A. R.
Texas Sanitarian, Austin.
Virginia Medical Monthly, Richmond.
Weekly Returns of Births and Deaths, Dublin, Ireland.
Bulletin de l'Academie Royale de Medicine, Brussels, Belgium.
Bulletin Mensuale, Torino, Italy.
Il Rosario, Pompeli, Italy.
Journal D'Hygiene, Paris.
L'Hygiene Practique, Paris.
Bulletins and Sanitary Publications, Ministero del' Interno—Direzione Della Sanitá Publica, Rome, Italy.
Bulletins and Sanitary Publications, Ministero de la Gobernacion—Direction General de Beneficencia V. Sanidad, Madrid, Spain.
Revue Internationale Bibliographie, Medicale, etc., Paris, France.
Tablettes Mensuelles de la Société Royale de Medicine Publique, Brussels, Belgium.
Veroff. des Kaiserlichen Gesundheitsamtes, Berlin.
Sei-i-kwai Medical Journal, Tokyo, Japan.

## LOANS FROM THE LIBRARY.

Publications drawn out, and not yet returned, are as follows:

### PROF. R. C. KEDZIE, AGRICULTURAL COLLEGE, MICH.

Report of the National Board of Health for the year 1879.

### C. C. YEMANS, M. D., DETROIT, MICH.

Report on Plan of Securing Records of Deaths—Harris.
State Board of Health, Indiana, etc. (pamphlet)—Stevens.
Some Fallacies on Statistics—Rumsey.
Death Rate of Each Sex in Michigan—Baker.

### MRS. M. W. HOWARD, LANSING, MICH.

Popular Science Monthly for Feb., 1892.

### PROF. G. J. KOLLEN, HOLLAND, MICH.

Parkes' Hygiene.
Trans. Indiana State Medical Society.
Johnston's Chemistry of Common Life.
Steele's Hygienic Physiology.
Alcohol and Hygiene—Coleman.
Trans. N. Y. Medical Society.

HON. FRANK WELLS, LANSING, MICH.

Report National Pure Food Commission, 1887.
Medical News, Vol. 59, numbers for July 18 and 25, 1891.
British Medical Journal, Supplement for July 20, 1891.

GEORGE E. WILLITTS, LANSING, MICH.

Descriptive Sociology—Spencer.

WILLIAM O. HUME, M. D., CORUNNA, MICH.

Three Communications on Rabies—Gibier.

O. H. BRUCKER, M. D., LANSING, MICH.

Fothergill's Handbook of Treatment.

PROF. DELOS FALL, M. S., ALBION, MICH.

Report of the American Public Health Assoc. (Library No. 993.)
4th Annual Report of the State Board of Health, of South Carolina, 1883.

THEO. R. MAC CLURE, LANSING, MICH.

Graham's Standard Phonetic Dictionary.
Materia Medica and Therapeutics—Bartholow.
Gray's Anatomy.
Abbott's Principles of Bacteriology.
Practice of Medicine, two Vols.—Fagge.
How to use the Microscope—Beale.
Manual of Microscopic Mounting—Martin.
Microscopic Technology—Frey.
Practical Biology—Huxley.
Text-book on Zoology—Nicholson.
Microscopical Technology—Friedländer.
Water Analyses—MacDonald.
Jour. D'Hygiene, Vol. 17, 1892.
Longstaff's Statistics.
Bulletin Iowa State Board of Health, Vols. 3-5, 1889-92.
Jour. American Medical Sciences, Jan., April, July, Oct., 1887.
Revue Internationale Bibliographie, Medicale, Vol. 2, 1892.
British Medical Journal, Vol. 2, 1889.
British Medical Journal, Vol. 1, 1890.
Bacteria and Their Products—Woodhead.
Centralblatt für Bakteriologie und Parasitenkunde, Vol. 13, 1893.
London Lancet, May 19, 1894.
Journal D'Hygiene, Nos. 891 and 893, 1893.
Animal Plagues—Fleming.
N. Y. Therapeutic Gazette, No. 2, 1894.
British Medical Journal, Nos. 1690, 1680, 1676, 1739.
London Lancet, Nos. 3679 and 3684.
Medical News, Vol. 64, June 16, 1894.
Text-book on Meteorology (Library No. 170).
Weather (Library No. 6650).
Principles of Biology—Spencer.
The Story of Bacteria—Prudden.

PROF. S. W. BAKER, BIG RAPIDS, MICH.

Sanitary Conditions of School Houses, etc.
Trans. Amer. Social Science Assoc., 1874 (Library No. 878).
Report of the Committee Concerning Sanitary Conditions of Schools in Philadelphia (Library No. 1767).
Trans. Sanitary Institute of Great Britain (Library No. 4688).

HENRY F. LYSTER, M. D., DETROIT, MICH.

Sewerage at Providence, R. I.—Waring.
Storm Water in Town Sewerage—Waring.
Sewerage of Cities—Waring.
Separate System of Sewerage—Waring.
Climatic Treatment of Consumption (Library No. 6238).
Medical Committees of Mass. Medical Society.
The Philanthropic Index and Review, June, 1889.
Sequin on Lunacy.

New Facts and Remarks on Idiocy—Seguin.
Children of the State (Library No. 5545).
Conference of Corrections and Charities, Omaha, 1887.

HENRY B. BAKER, M. D., LANSING, MICH.

Science, March 24, 1893.
U. S. Abstract of Sanitary Reports, Vol. 8, April 14, 1893.
U. S. Abstract of Sanitary Reports, Vol. 8, June 9, 1893.
U. S. Abstract of Sanitary Reports, Vol. 8, June 23, 1893.
Manufacturer and Builder, March, 1889.
Education and Culture as relates to Health and Disease of Women.
U. S. Quarantine Laws and Regulations, Feb. 24, 1893.
U. S. Abstract of Sanitary Reports, Vol. 8, Feb. 10, 1893.
Immigration Laws and Regulations, March 11, 1893.
U. S. Abstract of Sanitary Reports, Vol. 8, April 21, 1893.
Annual Report of the St. Lawrence Quarantine, 1892—Montizambert.
Confectioner's Journal, Jan., 1894.
National Popular Review, March, 1894.

O. L. WILBUR, M. D., LANSING, MICH.

Report of the American Public Health Assoc., Vol. 5.
Statistics of the City of Havre, France, 1880-1889.
20th Registrar-General's Report of England.

JOHN HEVENER, LAPEER, MICH.

Hospitals: Their Organization and Construction—Wylie.
Cottage Hospitals—Burdett.

HOWARD BAKER, LANSING, MICH.

Gray's Descriptive and Surgical Anatomy.

ROBERT SMITH & CO., LANSING, MICH.

Official Weekly Returns of Births, Deaths, etc., Dublin, Ireland, Vol. 30, 1893.

LOUIS HOGREFE, M. D., DETROIT, MICH.

19th Annual Report of the Local Government Board of England.

The following table exhibits the amounts and kinds of hard paper on hand at the time of making the last report, the amounts purchased during the year, the amounts used, and the amounts now on hand (June 30, 1894) :—

| Kind of Paper. | On hand at last Report. | | Purchased since last Report. | | Used during the fiscal year. | | On hand June 30, 1894. | |
|---|---|---|---|---|---|---|---|---|
| | Reams. | Sheets. | Reams. | Sheets. | Reams. | Sheets. | Reams. | Sheets. |
| Flat | 4 | 450 | | | 1 | 422 | 8 | 28 |
| Crown | 5 | 450 | 12 | 240 | 12 | 475 | 5 | 215 |
| Folio-Post | 25 | 226 | 29 | | 34 | 111 | 20 | 115 |
| Demy | 3 | 298 | 3 | | 4 | 389 | 1 | 389 |
| Medium | 3 | 220 | | | | | 3 | 220 |
| Byron Weston's Folio-Post | | 150 | | | | 5 | | 145 |
| Imperial (Byron Weston's) | 1 | | | | | | 1 | |
| B. Hornet (linen) | 2 | | 11 | | 11 | | 2 | |
| Fools Cap | | 410 | | | | 100 | | 810 |
| Legal Cap | 1 | 200 | | | | 60 | 1 | 140 |
| Blotting paper | | 130 | | | | 36 | | 94 |
| Blue cover paper | 9 | 200 | | | 4 | 125 | 5 | 75 |
| Postoffice paper | 1 | 200 | | | | | 1 | 200 |
| Book paper, 8 S. C. White | 4 | 300 | | | 1 | 241 | 8 | 59 |
| Manilla | 4 | 230 | | | 1 | 465 | 2 | 245 |

There are now on hand 9,430 sheets of hard paper (half letter size) and 380 sheets of note size. There were about 145,891 envelopes on hand at the time of making the last annual report of property, 68,500 envelopes of various kinds for use in the office have been purchased since, making a total of 214,391. There are now on hand 54,952 printed envelopes, and about 102,075 envelopes that are not printed, making a total of about 157,027. About 57,364 envelopes have been used in the work of the office during this fiscal year.

Vouchers for postage (for use in the office) have been allowed during the year to the amount of $1,250. The cost of postage during the fiscal year has been $1,170.69, as follows:—

| | |
|---|---|
| Distribution of Annual Reports | $213 00 |
| General distribution of documents and circulars | 340 85 |
| Sending weekly and monthly bulletins | 66 55 |
| Collection and dissemination of information in regard to communicable and other diseases | 36 73 |
| Sending announcements and programs for sanitary conventions | 55 12 |
| Sending meteorological material to observers | 7 92 |
| Work in connection with the collection of sickness statistics | 28 25 |
| Sending notice of possibly infected immigrants, etc., in connection with State quarantine | 69 52 |
| Regular and special correspondence of the office, postal cards and all other postage (including a considerable amount for distribution of documents on the restriction of diphtheria, scarlet ever, small-pox, etc., to localities where those diseases occurred) | 275 44 |
| Postage money on hand at end of fiscal year | 79 31 |
| | $1,170 69 |

### TOTAL AMOUNT AND CLASSIFICATION OF EXPENDITURES BY THE STATE BOARD OF HEALTH, AS PER VOUCHERS 2295–2445 INCLUSIVE, DURING THE FISCAL YEAR ENDING JUNE 30, 1894.

| | |
|---|---|
| Chemical analyses | -------- |
| Engraving, drawing, etc. | -------- |
| Expenses of members:— | |
| Attending meetings | $64 65 |
| Other official | 584 93 |
| Instruments and books | 184 86 |
| Paper, stationery, etc | 692 40 |
| Postage:— | |
| Office | 1,250 00 |
| Members | 1 00 |
| Printing and binding | 732 91 |
| Secretary | 3,000 00 |
| Special investigations | -------- |
| Expressage | 79 88 |
| Telegrams | 10 91 |
| Telephones | 40 00 |
| Miscellaneous | 204 92 |
| Total | $6,840 46 |

Respectfully submitted,

HENRY B. BAKER,
*Secretary.*

## EXPENDITURES BY THE STATE BOARD OF HEALTH IN THE CALENDAR YEAR 1893.

The foregoing is reported in compliance with law, relative to the fiscal year. But the appropriations for the Board are for the calendar year, and they amount to six thousand dollars. The expenditures for any calendar year, therefore, cannot exceed six thousand dollars. The following is a classified statement of expenditures for the calendar year 1893:—

### CLASSIFIED STATEMENT OF EXPENDITURES BY THE BOARD DURING THE CALENDAR YEAR, 1893.

| | |
|---|---|
| Chemical analyses | -------- |
| Engraving, drawing, etc. | -------- |
| Expenses of members:— | |
| Attending meetings | $69 50 |
| Other official | 267 10 |
| Instruments and books | 242 38 |
| Paper, stationery, etc. | 750 25 |
| Postage:— | |
| Office | 950 00 |
| Members | -------- |
| Printing and binding | 580 21 |
| Secretary | 2,750 00 |
| Special investigations | -------- |
| Expressage | 62 92 |
| Telegrams | 8 84 |
| Telephone | 40 85 |
| Miscellaneous | 237 80 |
| Total | $5,959 85 |

## EXPENDITURES ON ACCOUNT OF THE BOARD.

The appropriations ($6,000) at the disposal of the State Board of Health are for certain specified purposes, not including clerk hire, the publication of the Annual Report, or the expenses in the examination of plans for public buildings; these expenditures *on account of* but not by the Board are provided for by other acts of the legislature than those appropriating money to be expended by the Board, and the accounts are kept in other offices; not in the office of the State Board of Health; the accounts for clerk hire are kept by the Auditor General, and are reported in his Annual Report; the account for publication of the Annual Reports, and for expenses in the examinations of plans for public buildings, are kept by the Board of State Auditors, and are published in the Annual Report of that Board.

Respectfully submitted,

Henry B. Baker,

*Secretary.*

# VENTILATION.

BY HENRY B. BAKER, M. D., SECRETARY OF STATE BOARD OF HEALTH, LANSING, MICH.

MR. PRESIDENT, LADIES AND GENTLEMEN: *In the time allotted to me, I propose to suggest some of the general facts and principles which need to be understood by all who have to do with the subject of ventilation.

These general facts and principles may be profitably studied in groups, as follows:

1. Facts relating to the constant needs of the living body for unbreathed air.
2. Facts relating to air and its movements with reference to the particles which constitute the specific causes of diseases.
3. Facts relating to the causes of movements, and the rates of movement of air.

## *Quantity of Air Needed for Respiration.*

1. In the first-mentioned group is the well-known fact that unless fresh air is supplied to the human body, life is not sustained. Fresh air is needed to supply the body with oxygen which is consumed in the vital processes which yield the forces and motions which constitute the phenomena of life. Fresh air is needed also to displace, drive away, and remove products of vital action, which, if allowed to remain in the body, poison it and lead toward death.

How much fresh air is needed? Those who have studied this subject have generally agreed that about 2,000 cubic feet of fresh air per hour is a fair allowance for each person; and as the vital processes of children are more rapid than those of adults, I believe that school children should have as much as adults.

There is a common fallacy that in a large room a less quantity of air per hour is sufficient. That is true only for the very short time until the air of the room has been once used. However, the room should be large enough to allow at least twenty-five square feet of floor space to each pupil or person; and high enough to allow at least six hundred cubic feet of air space to each pupil or person. One reason for this is that in a less space per person the requisite quantity of air cannot be moved through the space without causing drafts which are dangerous to health. Just how drafts cause sickness may not be fully dealt with here and now; but that drafts do cause sickness has been abundantly proved. In order to prevent drafts the space allowed for each occupant of a room must not be less than as just stated.

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* This was a paper read at the Sanitary Convention held at Hillsdale in July, 1893.

### *Proper Location of Foul-air Outlets.*

2. Recent progress in sanitary science has demonstrated the fact that many diseases, now known as "specific," are caused by living organisms, microscopic in size, but particulate, having weight, being capable of settling as dust upon floors and articles in inhabited rooms. In the human body, there seem to be many natural protections against the inhaling of such dangerous particles. In the first place the normal nose is so formed as greatly to avoid catching dust particles which being heavier than air have a downward motion—the normal nostrils do not open upward, they open downward. In the next place, the opening of such nostril is generally protected by fine hairs, which, being moistened by the air exhaled, tend to catch and prevent the entrance of dust. Thirdly, normal secretions of the membranes of the nose and throat tend to stop the further entrance of particles; and the nasal mucus has power to destroy at least some of the germs of disease. Notwithstanding these protections, disease germs do gain entrance into the body under favoring conditions.

A proper system of ventilation must take account of this group of facts, and must ensure that the general movement of the air of every inhabited room shall be downward. This makes it essential that the foul-air outlet of every room should be at the floor level. And it is best that the fresh-air inlet shall not be in the floor. It is not well either, as a rule, that the external source of fresh air shall be at the ground level, because of the liability to take in injurious dust.

### *Causes of Movement of Air, and Rates.*

3. In the third group the most important fact, with reference to natural ventilation, is this—that, except as caused by fans, blowers, and other mechanical means, movements of air result from differences in weight of air at different temperatures, warm air being expanded air, and therefore lighter than cold air, which is denser,—in other words, heavier. Accordingly, warm air rises when its place is supplied by colder air; and cold air tends to fall in under and to displace warmer air. The rate of this movement of air depends upon the amount of the difference in the temperatures of the two bodies of air, and upon the height of the two columns of air—the displaced and the displacing columns of air. I have here a table, taken from Parkes' Hygiene, stating the rate of movement of air under different conditions of temperature and height of column. I will not undertake to read the entire table, but will merely state a few of the conditions and resulting rates of movements.

*Table to show the Velocity of Air in linear feet per minute. Calculated from Montgolfier's formula; the expansion of air being taken as 0.002 for each degree Fahrenheit, and one-fourth being deducted for friction. (Round numbers have been taken.)*

| Height of column in feet. | Difference Between Internal and External Temperature, stated in degrees Fah., 3 to 30 degrees. | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 30 |
| 10 | 88 | 102 | 114 | 125 | 135 | 144 | 153 | 161 | 169 | 176 | 183 | 190 | 197 | 204 | 210 | 216 | 222 | 228 | 233 | 239 | 244 | 249 | 254 | 279 |
| 11 | 92 | 107 | 119 | 131 | 141 | 151 | 160 | 169 | 177 | 185 | 192 | 200 | 207 | 213 | 220 | 226 | 233 | 239 | 245 | 250 | 256 | 261 | 267 | 292 |
| 12 | 96 | 111 | 125 | 136 | 147 | 158 | 167 | 176 | 185 | 193 | 201 | 209 | 216 | 223 | 230 | 237 | 243 | 249 | 255 | 261 | 267 | 273 | 279 | 305 |
| 13 | 100 | 116 | 130 | 140 | 153 | 164 | 174 | 183 | 192 | 201 | 209 | 217 | 225 | 232 | 239 | 246 | 253 | 259 | 266 | 272 | 278 | 284 | 290 | 318 |
| 14 | 104 | 120 | 135 | 147 | 159 | 170 | 181 | 190 | 200 | 209 | 217 | 225 | 233 | 241 | 248 | 255 | 262 | 269 | 276 | 282 | 289 | 295 | 301 | 330 |
| 15 | 108 | 125 | 139 | 153 | 165 | 176 | 187 | 197 | 207 | 216 | 225 | 233 | 241 | 249 | 257 | 264 | 272 | 279 | 286 | 292 | 299 | 305 | 312 | 341 |
| 16 | 111 | 129 | 144 | 158 | 170 | 182 | 193 | 204 | 213 | 223 | 232 | 241 | 249 | 257 | 265 | 273 | 281 | 288 | 295 | 302 | 309 | 315 | 322 | 353 |
| 17 | 115 | 133 | 148 | 162 | 176 | 188 | 199 | 210 | 220 | 230 | 239 | 248 | 257 | 265 | 274 | 282 | 289 | 297 | 304 | 311 | 318 | 325 | 332 | 363 |
| 18 | 118 | 136 | 153 | 167 | 181 | 193 | 205 | 216 | 226 | 237 | 246 | 255 | 264 | 273 | 282 | 290 | 298 | 305 | 313 | 320 | 327 | 335 | 342 | 374 |
| 19 | 121 | 140 | 157 | 172 | 186 | 198 | 210 | 222 | 233 | 243 | 253 | 262 | 272 | 281 | 289 | 298 | 306 | 314 | 321 | 329 | 336 | 344 | 351 | 384 |
| 20 | 125 | 144 | 161 | 176 | 190 | 204 | 216 | 228 | 239 | 249 | 259 | 269 | 279 | 288 | 297 | 305 | 314 | 322 | 330 | 338 | 345 | 353 | 360 | 394 |
| 21 | 128 | 147 | 165 | 181 | 195 | 209 | 221 | 233 | 245 | 255 | 266 | 276 | 286 | 295 | 304 | 313 | 321 | 330 | 338 | 346 | 354 | 361 | 369 | 404 |
| 22 | 131 | 151 | 169 | 185 | 200 | 214 | 226 | 239 | 250 | 261 | 272 | 282 | 292 | 302 | 311 | 320 | 329 | 338 | 346 | 354 | 362 | 370 | 378 | 414 |
| 23 | 134 | 154 | 173 | 189 | 204 | 218 | 232 | 244 | 256 | 267 | 278 | 289 | 299 | 309 | 318 | 327 | 336 | 345 | 354 | 362 | 370 | 378 | 386 | 423 |
| 24 | 136 | 158 | 176 | 193 | 209 | 223 | 237 | 249 | 261 | 273 | 284 | 295 | 305 | 315 | 325 | 335 | 344 | 353 | 361 | 370 | 378 | 386 | 394 | 432 |
| 25 | 139 | 161 | 180 | 197 | 213 | 227 | 241 | 254 | 267 | 279 | 290 | 301 | 312 | 322 | 332 | 342 | 351 | 360 | 369 | 378 | 386 | 394 | 402 | 441 |
| 26 | 142 | 164 | 183 | 201 | 217 | 232 | 246 | 259 | 272 | 284 | 296 | 307 | 318 | 328 | 338 | 348 | 358 | 367 | 376 | 385 | 394 | 402 | 410 | 450 |
| 27 | 145 | 167 | 187 | 205 | 221 | 237 | 251 | 264 | 277 | 290 | 302 | 313 | 324 | 335 | 345 | 355 | 365 | 374 | 383 | 392 | 401 | 410 | 418 | 458 |
| 28 | 147 | 170 | 190 | 207 | 225 | 241 | 255 | 269 | 282 | 295 | 307 | 319 | 330 | 341 | 351 | 361 | 371 | 381 | 390 | 399 | 408 | 417 | 426 | 467 |
| 29 | 150 | 173 | 194 | 212 | 229 | 245 | 260 | 274 | 287 | 300 | 312 | 324 | 335 | 347 | 357 | 368 | 378 | 388 | 397 | 407 | 416 | 425 | 433 | 475 |
| 30 | 153 | 176 | 197 | 216 | 233 | 249 | 264 | 279 | 292 | 305 | 318 | 330 | 341 | 353 | 333 | 374 | 384 | 394 | 404 | 414 | 423 | 432 | 441 | 483 |
| 31 | 155 | 179 | 200 | 219 | 237 | 253 | 269 | 283 | 297 | 310 | 323 | 335 | 347 | 358 | 369 | 380 | 391 | 401 | 411 | 420 | 430 | 439 | 448 | 491 |
| 32 | 158 | 182 | 204 | 223 | 241 | 257 | 273 | 288 | 302 | 315 | 328 | 341 | 353 | 364 | 375 | 386 | 397 | 407 | 417 | 427 | 437 | 446 | 455 | 499 |
| 33 | 160 | 185 | 207 | 226 | 245 | 261 | 277 | 292 | 307 | 320 | 333 | 346 | 358 | 370 | 381 | 392 | 403 | 414 | 424 | 434 | 443 | 453 | 462 | 506 |
| 34 | 162 | 188 | 210 | 230 | 248 | 265 | 282 | 297 | 311 | 325 | 338 | 351 | 363 | 375 | 387 | 398 | 409 | 420 | 430 | 440 | 450 | 460 | 469 | 514 |
| 35 | 165 | 190 | 213 | 233 | 252 | 269 | 286 | 301 | 316 | 330 | 343 | 356 | 369 | 381 | 393 | 404 | 415 | 426 | 436 | 447 | 457 | 467 | 476 | 522 |
| 36 | 167 | 193 | 216 | 236 | 255 | 273 | 290 | 305 | 320 | 334 | 348 | 361 | 374 | 386 | 398 | 410 | 421 | 432 | 442 | 453 | 463 | 473 | 483 | 529 |
| 37 | 170 | 196 | 219 | 240 | 259 | 277 | 294 | 310 | 325 | 339 | 353 | 366 | 379 | 392 | 404 | 415 | 427 | 438 | 448 | 459 | 470 | 480 | 490 | 536 |
| 38 | 172 | 195 | 222 | 243 | 262 | 281 | 298 | 314 | 329 | 344 | 358 | 371 | 384 | 397 | 409 | 421 | 432 | 444 | 454 | 465 | 476 | 486 | 496 | 543 |
| 39 | 174 | 201 | 225 | 246 | 266 | 284 | 302 | 318 | 333 | 348 | 362 | 376 | 389 | 402 | 414 | 426 | 438 | 450 | 461 | 471 | 482 | 492 | 503 | 551 |
| 40 | 176 | 204 | 228 | 249 | 269 | 288 | 305 | 322 | 338 | 353 | 367 | 381 | 394 | 407 | 420 | 432 | 444 | 455 | 467 | 477 | 488 | 498 | 509 | 558 |
| 45 | 187 | 216 | 241 | 264 | 285 | 305 | 324 | 341 | 358 | 374 | 389 | 404 | 418 | 432 | 445 | 458 | 471 | 483 | 495 | 506 | 518 | 529 | 540 | 591 |
| 50 | 197 | 228 | 254 | 279 | 301 | 322 | 341 | 360 | 377 | 394 | 401 | 426 | 441 | 455 | 469 | 483 | 496 | 509 | 522 | 534 | 546 | 558 | 569 | 623 |
| Degrees Fahr. | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 30 |

This table is taken from Parkes' Hygiene, American Edition 1884, William Wood and Co., page 194. Its reading is easy, but may be illustrated as follows: Suppose the height of the shaft is 10 feet, and the difference in temperature outdoors and indoors is 3 degrees (as in the first line, first two columns) then the rate of movement of the air is 88 linear feet per minute. Suppose the height of the shaft is 14 feet, and the difference in temperature is 11 degrees; then the velocity of the air is 200 linear feet per minute. If thirty persons in the room are each to have 2,000 cubic feet of air per hour, all are to have 1,000 cubic feet per minute, then, under the conditions named, the cross-section of the shaft must have an area of five square feet. In practice, however, it is seldom that a foul air shaft is not higher than 14 feet.

The foregoing rates are in ordinary straight shafts with no extra cause of friction; if the shafts are very small, or the friction unusual, the rate of movement is lessened.

It is a general fact, that must be held in mind, that each right angle in a shaft reduces the velocity of the air in that shaft one-half.

Given the number of proposed inmates of a room, the height of the shaft, and the difference of temperature between the in-door and the out-door air, then the sizes of inlets, outlets, and shafts, can be computed, by means of the data which have now been stated, allowing two thousand cubic feet of air per hour per person.

In this climate there is no difficulty in securing good ventilation in the warmest weather, because then windows and doors are usually open; nor in the coldest weather, because then the difference in temperature is so great between the out-door and the in-door air that very rapid movement of the in-door air is caused by permitting to be balanced against it a column of dense out-door air. The difficulty in securing ventilation occurs in the spring and autumn, when there is little difference in the temperature of the in-door and the out-door air. The ventilation of every inhabited room should be so planned as to be susceptible of regulation and especially of extension or expansion, by means of registers into flues and shafts of a size ample for times of slight difference in temperature of the out-door and the in-door air. The calculations for sizes of inlets, outlets, flues and shafts, should be made upon the basis of a very slight difference of temperature.

### *Each Room Should Have Separate Ventilation.*

One important principle which is perhaps most frequently violated by architects, contractors, and builders, was stated by Prof. R. C. Kedzie in the first Annual Report of the Michigan State Board of Health, page 95, as follows: "For successful ventilation I consider it essential that the foul air of each room shall enter a separate compartment in the ventilaing shaft, and not one common shaft." The old "Ruttan" system, and the "Smead dry-closet system" both violate this very important principle. Some of the reasons why it is important that the foul-air shaft from each room shall extend separate and distinct to the outer-air, are as follows: It is practically impossible to so control all the conditions that the pressure of air into two rooms shall always be the same; all openings into one room (except registers) may at some time be closed, while at the same time a window or a door into the other room may be open; one room may be on the side toward which the wind is blowing, while the other room is on the side from which the wind is blowing; in such cases a common vent shaft is filled with air from the room into which the pressure of air is greatest, to the exclusion of the foul air from the other room, which is, therefore, not ventilated. An instance, at one of the State asylums in Michigan, will illustrate another reason: foul-air shafts from rooms on both sides of the building extended up to the attic, where they terminated in that common receptacle from which a common shaft extended through the roof. During a wind, a window being open in a room on that side of the building on which the wind did not blow, a current of foul air was found to come down from the attic through the foul-air shaft and go out of the window, there being a constant circulation of foul air through the room, while the warm fresh air which was supposed to enter the room through a transom was not entering; the only air supplied to the inmate of the room being the foul air from the other side of the building, which might be not only impure with products of respiration, but also contain the germs of any communicable disease which like consumption might be present in the other rooms of the asylum. Such "back-drafts" are not uncommon in school buildings in which this principle under discussion is violated; and such "back-drafts" are believed to be especially dangerous where they come from excreta which is dry from which germs of disease may then be detached and float in the foul air.

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In the discussion following a paper by Prof. French of Hillsdale and this paper, Dr. Baker said:—I do not believe in having the heat from steam pipes in the rooms; I think it is a vicious system. If we are to have the heating by steam, which I agree with the Professor is the pleasantest, perhaps, unless it is the hot water, the steam pipes should not be in the room, but should be where the fresh air, in coming from out of doors, shall pass over them into the room; that is called the "indirect" system. The method of heating by steam, having the coils in the room, is a vicious system, and there is no good way of ventilating in such a way of heating. You can smell the results of it as soon as you enter the room; the exhalations when the pipes are cold are condensed on the pipes, when they are heated again, they give them off; but the main difficulty is that, in that method of heating, there is no provision for fresh air. The "direct" method of steam heating is vicious, and ought not to be employed, as a rule, anywhere. The steam coils should be outside of the room, and the fresh air should pass over those coils into the room, and then, in the proper system, the air at the floor level is carried off.

*Prof. Delos Fall, Albion.*—With the direct system of heating, by steam, the system of ventilation is an extra affair, and must be worked out by itself; you have to provide an extra place for your air to come in and go out. You can provide that, of course, you can have a place for the fresh air to come in from outside of the building, and you can have a place for it to go out at the floor level, with the coils in the room; but the air comes into the room cold when its draft is often dangerous, and I see no way of having a proper supply of fresh air in the "direct" method of steam heating

*Mr. Goodrich, Hillsdale*—I would like to ask if there is much difference, as far as the heating and ventilation is concerned, between the steam heat and the hot water system?

*Dr. Baker, Lansing*—In the coldest weather, there is perhaps an advantage in having the steam: but there is a disadvantage in the spring and fall, when one needs a little heat, and not very much. If you have to heat the pipes up to 212 degrees before you get any heat, and then all at once you get great heat, that is not a very pleasant way to do. If you have the "indirect" method of heating, by means of hot water, you have the ideal system. It is expensive, perhaps; but when the fire is built and the water in the boiler is heated a few degrees, the circulation commences, and the incoming air is warmed, little or much as you desire; that is the great advantage of heating by hot water, that the heat is more easily suited to the temperature of the air in the spring and autumn months. In the coldest weather, it is an advantage to have the hot-water surface line in the boiler below the level of the radiator, and so heat by steam; that is a method that is easily accomplished by simply lowering the water in the boiler; and instead of passing the water through the coils, pass steam through; that can be done in the cold weather, and in the spring or fall the hot water can be used.

## MICHIGAN STATE BOARD OF HEALTH EXHIBIT AT THE WORLD'S FAIR.

The Michigan State Board of Health Exhibit at the World's Fair consisted of a set of the annual Reports of this Board for 1873 to 1891, inclusive, a large number of other publications of the office, and about twenty diagrammatic charts or diagrams showing the relations of diseases to meteorological conditions, and the results of public health work in Michigan. The diagrams were mostly 22 by 28 inches, placed in wing frames, hung on a standard so that they could be easily viewed by those wishing to study the exhibit. Two of the diagrams were large wall charts, one showing the lives saved by public-health work in Michigan, and the other showing the results of isolation and disinfection in the restriction of scarlet fever and diphtheria during the five years 1886-90. All these diagrams and charts were also photo-engraved, reduced in size to about 6¼ by 9¼ inches, and printed in pamphlet form for distribution to those interested in the exhibit. A large number also has since been distributed. The pamphlet is reproduced on the following pages.

The preparation of the diagrams caused the office much labor, in collecting the facts and making the diagrams; but the results have been very valuable for general and special educational purposes.

The exhibit was completed late in April, 1893, and was taken to Chicago about April 27. At that time the Anthropological Building was in a very incomplete condition, so the exhibit was installed in the Manufacturers Building, Department of Liberal Arts, which was under the direction of the Hon. Selim H. Peabody. Afterwards the exhibit was installed in the Anthropological Building, in the Bureau of Hygiene and Sanitation, under the direction of Doctor F. W. Brewer.

The exhibit received considerable attention, and seemed to be of interest to those who took the time for its study. The pamphlets, which served as a guide to the exhibit, were placed on a shelf in connection with the exhibit, and any person wishing a copy was at liberty to take one. Many copies of the pamphlet were thus distributed at the Fair; and many copies have been sent by mail to various parts of the World.

In several particulars that part of the exhibit which consisted of diagrams was unique: (1) There is nowhere else in the world so extensive sickness statistics; (2) there is nowhere else in the world so extensive meteorological data combined with statistics of coincident sickness; (3) there is nowhere else in the world so extensive contagious-disease statistics exhibiting the results of isolation and disinfection.

That part of the exhibit which was reproduced in the pamphlet is here put permanently on record, as follows:—

# RELATIVE
TO THE
# MICHIGAN STATE BOARD OF HEALTH EXHIBIT
IN THE
# ANTHROPOLOGICAL BUILDING
AT THE
# WORLD'S COLUMBIAN EXPOSITION
AT
# CHICAGO
IN
# 1893

[Published by the Michigan State Board of Health for free distribution to persons interested in any of the subjects treated.]

[209.]

[Third Edition.]

MICHIGAN STATE BOARD OF HEALTH SEAL.

BY AUTHORITY.

LANSING
ROBERT SMITH & CO., STATE PRINTERS AND BINDERS
1894

## BRIEF OUTLINE OF THE EXHIBIT.

This Exhibit includes: (1) an exhibit of the principal causes of sickness in Michigan, (2) an exhibit of the principal causes and conditions of deaths in Michigan, (3) an exhibit of the diseases which increase during or following hot weather, (4) an exhibit of the diseases which increase during or following cold weather, (5) the relations of individual diseases to their controlling meteorological conditions, by months, (6) the decrease in recent years of sickness from three important diseases, and (7) the decrease of the death-rate from three important communicable diseases in those years when efforts have been put forth for their restriction.

The diagrams Nos. 4 and 5, show that diarrhea and cholera morbus are apparently controlled by the atmospheric temperature, rising after the temperature rises and falling after the temperature falls.

No. 6 shows that intermittent fever follows closely the daily range of atmospheric temperature, which is the difference between the day and the night temperature, there being most intermittent fever when there is most exposure to great heat during the day and comparative cold during the night.

No. 7 shows that the sickness from remittent fever is coincident with or follows, inversely, the rise and fall of atmospheric ozone; there being most sickness following the months of least ozone.

No. 8 shows that the sickness from influenza almost exactly coincides with the atmospheric ozone; the more ozone the more influenza; the least ozone the least influenza; ozone and influenza being quantitatively related.

No. 9 shows that the sickness from pneumonia is quantitatively related to the atmospheric temperature and atmospheric ozone, the colder the atmosphere and the more ozone the more sickness from pneumonia, the higher the temperature and the less ozone the less sickness from pneumonia. Many of these diseases are known to be due to germs, but the germs apparently gain an entrance to the body through the influence of the irritating effects of cold, dry air, ozone and wind.

No. 10 shows that the sickness from diphtheira has close relation to the velocity of the wind, temperature of the atmosphere, and atmospheric ozone.

No. 11 shows that tonsillitis follows the cold atmosphere, the wind and the atmospheric ozone. It also shows that rheumatism follows tonsillitis.
No. 12 shows the relation of rheumatism to atmospheric ozone.

No. 13 shows the relation of consumption to atmospheric ozone. Consumption is another disease known to be due to a germ which apparently most generally gains entrance to the body because of the ozone and other throat irritants.

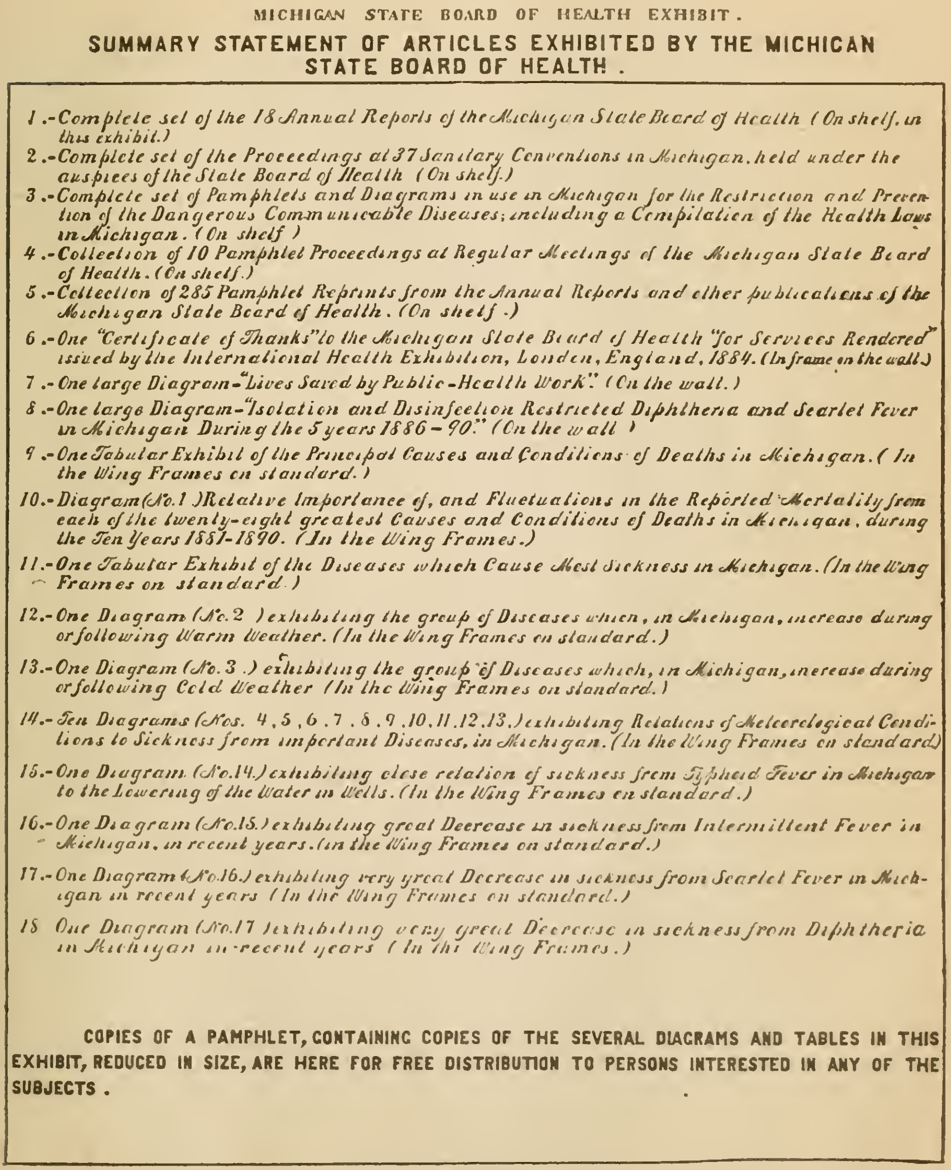
No. 14 shows that the sickness from typhoid fever is most when the water in wells is lowest, and the impurities in the well water most concentrated.

No. 15 shows that the sickness from intermittent fever in Michigan decreased nearly one half in the period between the years 1877 and 1887.

No. 16 shows that scarlet fever decreased in Michigan more than one-half in the period between the years 1877 and 1887.

No. 17 shows that diphtheria in Michigan decreased nearly three-fourths in the period between the years 1877 and 1887.

The diagram on page clvii shows that in those localities where isolation and disinfection are enforced there are only about one-fifth as many cases and deaths from scarlet fever as there are in those localities where these two measures are neglected. The diagram also shows that substantially the same is true relative to diphtheria. This proves that, as a rule, these diseases are spread almost directly from person to person, that, as a rule,



MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

## SUMMARY STATEMENT OF ARTICLES EXHIBITED BY THE MICHIGAN STATE BOARD OF HEALTH.

1.-Complete set of the 18 Annual Reports of the Michigan State Board of Health (On shelf, in this exhibit.)
2.-Complete set of the Proceedings at 37 Sanitary Conventions in Michigan, held under the auspices of the State Board of Health (On shelf.)
3.-Complete set of Pamphlets and Diagrams in use in Michigan for the Restriction and Prevention of the Dangerous Communicable Diseases; including a Compilation of the Health Laws in Michigan. (On shelf)
4.-Collection of 10 Pamphlet Proceedings at Regular Meetings of the Michigan State Board of Health. (On shelf.)
5.-Collection of 285 Pamphlet Reprints from the Annual Reports and other publications of the Michigan State Board of Health. (On shelf.)
6.-One "Certificate of Thanks" to the Michigan State Board of Health "for Services Rendered" issued by the International Health Exhibition, London, England, 1884. (In frame on the wall.)
7.-One large Diagram-"Lives Saved by Public-Health Work." (On the wall.)
8.-One large Diagram-"Isolation and Disinfection Restricted Diphtheria and Scarlet Fever in Michigan During the 5 years 1886-90." (On the wall)
9.-One Tabular Exhibit of the Principal Causes and Conditions of Deaths in Michigan. (In the Wing Frames on standard.)
10.-Diagram (No. 1) Relative Importance of, and Fluctuations in the Reported Mortality from each of the twenty-eight greatest Causes and Conditions of Deaths in Michigan, during the Ten Years 1881-1890. (In the Wing Frames.)
11.-One Tabular Exhibit of the Diseases which Cause Most Sickness in Michigan. (In the Wing Frames on standard.)
12.-One Diagram (No. 2) exhibiting the group of Diseases which, in Michigan, increase during or following Warm Weather. (In the Wing Frames on standard.)
13.-One Diagram (No. 3.) exhibiting the group of Diseases which, in Michigan, increase during or following Cold Weather (In the Wing Frames on standard.)
14.-Ten Diagrams (Nos. 4, 5, 6. 7. 8. 9. 10. 11. 12. 13.) exhibiting Relations of Meteorological Conditions to Sickness from important Diseases, in Michigan. (In the Wing Frames on standard.)
15.-One Diagram (No. 14.) exhibiting close relation of sickness from Typhoid Fever in Michigan to the Lowering of the Water in Wells. (In the Wing Frames on standard.)
16.-One Diagram (No. 15.) exhibiting great Decrease in sickness from Intermittent Fever in Michigan, in recent years. (In the Wing Frames on standard.)
17.-One Diagram (No. 16.) exhibiting very great Decrease in sickness from Scarlet Fever in Michigan in recent years (In the Wing Frames on standard.)
18 One Diagram (No. 17) exhibiting very great Decrease in sickness from Diphtheria in Michigan in recent years (In the Wing Frames.)

**COPIES OF A PAMPHLET, CONTAINING COPIES OF THE SEVERAL DIAGRAMS AND TABLES IN THIS EXHIBIT, REDUCED IN SIZE, ARE HERE FOR FREE DISTRIBUTION TO PERSONS INTERESTED IN ANY OF THE SUBJECTS.**

[Plate 195.]

they are not reproduced outside the human body, and that by isolation and disinfection these two diseases may be practically stamped out of existence.

The diagram on page clviii shows that throughout the entire State of Michigan the mortality from scarlet fever has been reduced more than one-half during those years in which isolation and disinfection have been

MICHIGAN STATE BOARD OF HEALTH EXHIBIT

## DISEASES WHICH CAUSE MOST SICKNESS IN MICHIGAN.

*Order of Prevalence of twenty-eight diseases in Michigan in the period of ten years 1881-1890, and in each of those years, judging from the "per cent of reports" which stated the presence of each of the diseases in connection with the reported "Order of prevalence" when and where each disease was present.*

| Order. | Diseases arranged in order of greatest prevalence. | Average Order 1881-90. | 1890. | 1889. | 1888. | 1887. | 1886. | 1885. | 1884 | 1883. | 1882. | 1881. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Rheumatism | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 4 | 4 | 2 |
| 2 | Neuralgia | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 4 |
| 3 | Bronchitis | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 3 |
| 4 | Intemittent Fever | 3 | 8 | 5 | 4 | 5 | 4 | 2 | 3 | 1 | 1 | 1 |
| 5 | Consumption, Pulmonary, | 5 | 6 | 6 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 7 |
| 6 | Diarrhea | 6 | 5 | 4 | 6 | 6 | 7 | 7 | 6 | 6 | 7 | 6 |
| 7 | Tonsillitis | 7 | 7 | 7 | 7 | 7 | 6 | 6 | 7 | 7 | 9 | 8 |
| 8 | Influenza | 8 | 4 | 8 | 8 | 8 | 8 | 8 | 9 | 8 | 8 | 9. |
| 9 | Remittent Fever | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 9 | 6 | 5 |
|  | (The Average Disease) | 10 | 9 | 10 | 11 | 11 | 10 | 10 | 10 | 11 | 11 | 11 |
| 10 | Pneumonia | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 11 | Erysipelas | 13 | 15 | 12 | 11 | 17 | 11 | 11 | 12 | 12 | 15 | 17 |
| 12 | Inflammation of Kidney | 14 | 15 | 14 | 16 | 15 | 13 | 12 | 11 | .... | .... | .... |
| 13 | Cholera morbus | 14 | 12 | 15 | 15 | 12 | 14 | 15 | 15 | 15 | 16 | 14 |
| 14 | Dysentery | 15 | 14 | 13 | 13 | 13 | 15 | 19 | 14 | 13 | 17 | 15 |
| 15 | Typho-malarial Fever | 15 | 19 | 17 | 14 | 14 | 16 | 14 | 17 | 14 | 12 | 13 |
| 16 | Whooping-cough | 15 | 13 | 11 | 20 | 19 | 12 | 13 | 13 | 19 | 13 | 19 |
| 17 | Measles | 17 | 11 | 22 | 12 | 16 | 22 | 25 | 23 | 11 | 20 | 11 |
| 18. | Pleuritis | 17 | 18 | 16 | 17 | .... | .... | .... | .... | .... | .... | .... |
| 19 | Cholera infantum | 18 | 17 | 18 | 18 | 18 | 17 | 18 | 18 | 17 | 19 | 16 |
| 20 | Diphtheria | 19 | 23 | 24 | 23 | 20 | 19 | 16 | 20 | 18 | 11 | 12 |
| 21 | Inflammation of bowels | 19 | 21 | 19 | 19 | 17 | 18 | 17 | 21 | 20 | 21 | 21 |
| 22 | Scarlet Fever | 22 | 21 | 22 | 22 | 20 | 20 | 19 | 19 | 16 | 14 | 20 |
| 23 | Typhoid Fever (enteric) | 20 | 20 | 20 | 21 | 21 | 21 | 21 | 22 | 21 | 18 | 18 |
| 24 | Puerperal Fever | 23 | 24 | 23 | 24 | 23 | 24 | 24 | 16 | 24 | 22 | 24 |
| 25 | Inflammation of brain | 24 | 27 | 27 | 27 | 24 | 23 | 22 | 24 | 22 | 23 | 25 |
| 26 | Membranous croup | 25 | 25 | 26 | 26 | 25 | 25 | 23 | 26 | 23 | 25 | 23 |
| 27 | Cerebro-spinal Meningitis | 25 | 26 | 25 | 25 | 26 | 26 | 26 | 25 | 25 | 24 | 22 |
| 28 | Small-pox | 27 | 28 | 28 | 28 | 27 | 27 | 27 | 27 | 26 | 26 | 26 |

*In the years 1881-3 intermittent fever, in the years 1884-5 neuralgia, and in the years 1886-90 rheumatism, caused most sickness. This does not imply that there was any increase in rheumatism, because, as indicated by this table, and is proved in the Diagram on that subject, intermittent fever decreased greatly.*

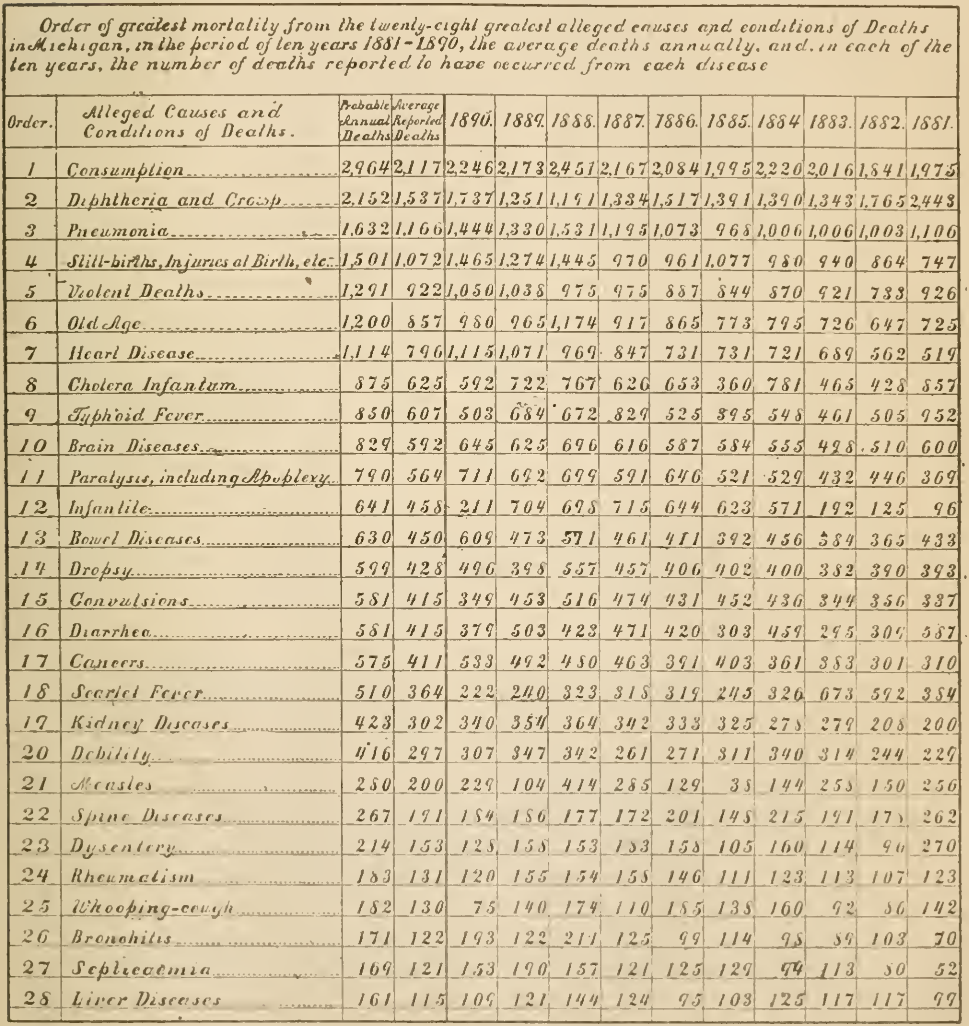
*The "Average Disease," of those reported, is included in this table, as a standard by which to judge the fluctuations; in 1890 it may be seen that the "Average Disease" was higher than usual by about one-tenth; this was due to the unusual prevalence of "Influenza" which it may be seen was twice as prevalent in 1890 as in the average year, the order in the average year being 8, while in 1890 it was 4. Pneumonia does not show any increase in 1890, nor any apparent change during the ten years.*

[Plate 497.]

undertaken. The two middle columns of that diagram show that four-fifths of the mortality from small-pox has disappeared since efforts for its restriction have been increased. In this same diagram the last two columns show that typhoid fever has decreased since efforts for its restriction were undertaken; that during those 12 years 1,671 lives have been saved in Michigan through the restriction of that disease.

### MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

## PRINCIPAL CAUSES AND CONDITIONS OF DEATHS IN MICHIGAN.



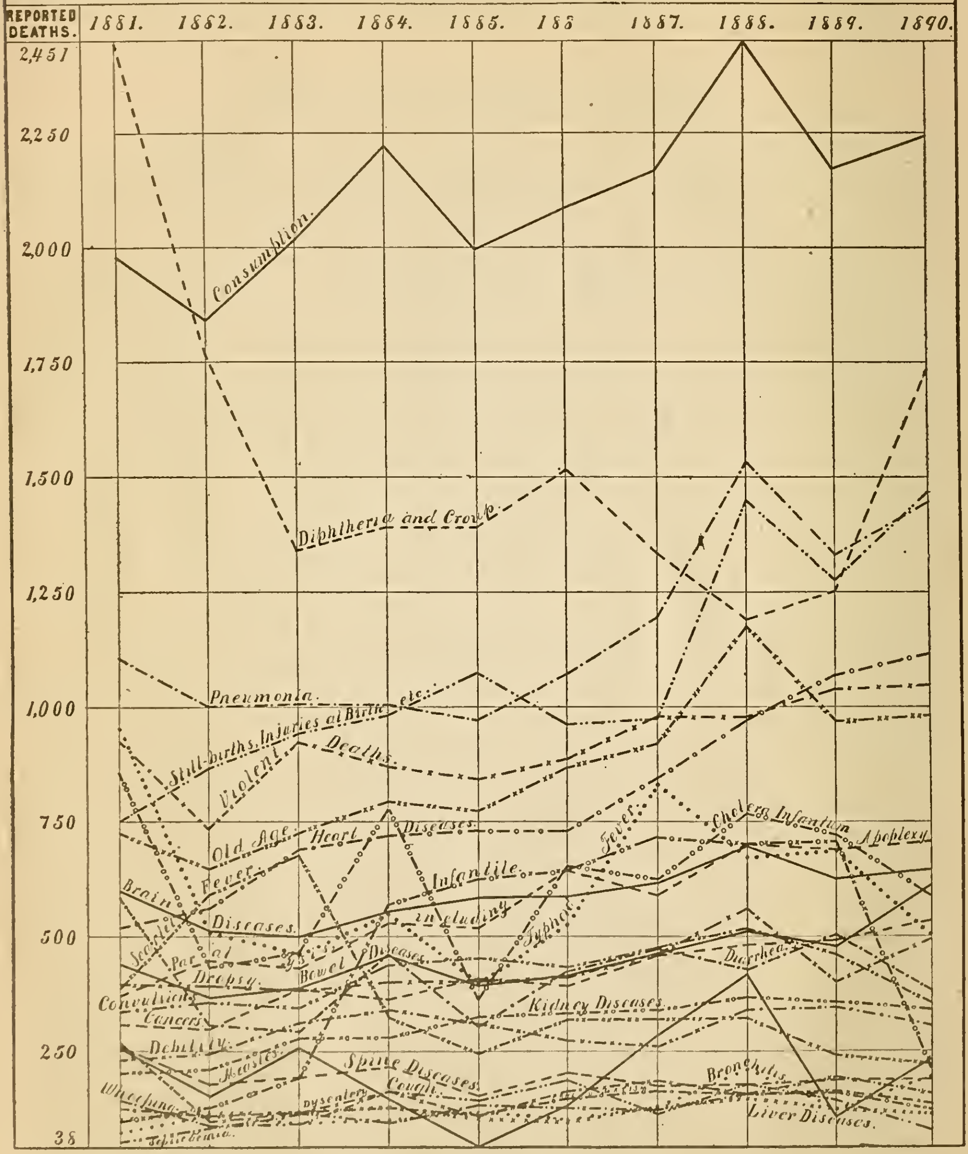
*Order of greatest mortality from the twenty-eight greatest alleged causes and conditions of Deaths in Michigan, in the period of ten years 1881-1890, the average deaths annually, and in each of the ten years, the number of deaths reported to have occurred from each disease*

| Order. | Alleged Causes and Conditions of Deaths. | Probable Annual Deaths | Average Reported Deaths | 1890. | 1889. | 1888. | 1887. | 1886. | 1885. | 1884 | 1883. | 1882. | 1881. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Consumption | 2,964 | 2,117 | 2,246 | 2,173 | 2,451 | 2,167 | 2,084 | 1,995 | 2,220 | 2,016 | 1,841 | 1,975 |
| 2 | Diphtheria and Croup | 2,152 | 1,537 | 1,737 | 1,251 | 1,191 | 1,334 | 1,517 | 1,391 | 1,390 | 1,343 | 1,765 | 2,443 |
| 3 | Pneumonia | 1,632 | 1,166 | 1,444 | 1,330 | 1,531 | 1,195 | 1,073 | 968 | 1,006 | 1,006 | 1,003 | 1,106 |
| 4 | Still-births, Injuries at Birth, etc. | 1,501 | 1,072 | 1,465 | 1,274 | 1,445 | 970 | 961 | 1,077 | 980 | 940 | 864 | 747 |
| 5 | Violent Deaths | 1,291 | 922 | 1,050 | 1,038 | 975 | 975 | 887 | 844 | 870 | 921 | 733 | 926 |
| 6 | Old Age | 1,200 | 857 | 980 | 965 | 1,174 | 917 | 865 | 773 | 795 | 726 | 647 | 725 |
| 7 | Heart Disease | 1,114 | 796 | 1,115 | 1,071 | 969 | 847 | 731 | 731 | 721 | 689 | 562 | 519 |
| 8 | Cholera Infantum | 875 | 625 | 592 | 722 | 767 | 626 | 653 | 360 | 781 | 465 | 428 | 857 |
| 9 | Typhoid Fever | 850 | 607 | 503 | 684 | 672 | 829 | 525 | 395 | 548 | 461 | 505 | 952 |
| 10 | Brain Diseases | 829 | 592 | 645 | 625 | 696 | 616 | 587 | 584 | 555 | 498 | 510 | 600 |
| 11 | Paralysis, including Apoplexy | 790 | 564 | 711 | 692 | 699 | 591 | 646 | 521 | 529 | 432 | 446 | 369 |
| 12 | Infantile | 641 | 458 | 211 | 704 | 698 | 715 | 644 | 623 | 571 | 192 | 125 | 96 |
| 13 | Bowel Diseases | 630 | 450 | 609 | 473 | 571 | 461 | 411 | 392 | 456 | 384 | 365 | 433 |
| 14 | Dropsy | 599 | 428 | 496 | 398 | 557 | 457 | 406 | 402 | 400 | 382 | 390 | 393 |
| 15 | Convulsions | 581 | 415 | 349 | 453 | 516 | 474 | 431 | 452 | 436 | 344 | 356 | 337 |
| 16 | Diarrhea | 581 | 415 | 379 | 503 | 423 | 471 | 420 | 303 | 459 | 295 | 309 | 587 |
| 17 | Cancers | 575 | 411 | 533 | 492 | 480 | 463 | 391 | 403 | 361 | 383 | 301 | 310 |
| 18 | Scarlet Fever | 510 | 364 | 222 | 240 | 323 | 318 | 319 | 245 | 326 | 673 | 592 | 384 |
| 19 | Kidney Diseases | 423 | 302 | 340 | 354 | 364 | 342 | 333 | 325 | 278 | 279 | 208 | 200 |
| 20 | Debility | 416 | 297 | 307 | 347 | 342 | 261 | 271 | 311 | 340 | 314 | 244 | 229 |
| 21 | Measles | 280 | 200 | 229 | 104 | 414 | 285 | 129 | 38 | 144 | 258 | 150 | 256 |
| 22 | Spine Diseases | 267 | 191 | 184 | 186 | 177 | 172 | 201 | 148 | 215 | 191 | 178 | 262 |
| 23 | Dysentery | 214 | 153 | 128 | 158 | 153 | 183 | 158 | 105 | 160 | 114 | 96 | 270 |
| 24 | Rheumatism | 183 | 131 | 120 | 155 | 154 | 158 | 146 | 111 | 123 | 113 | 107 | 123 |
| 25 | Whooping-cough | 182 | 130 | 75 | 140 | 174 | 110 | 185 | 138 | 160 | 92 | 86 | 142 |
| 26 | Bronchitis | 171 | 122 | 193 | 122 | 211 | 125 | 99 | 114 | 98 | 89 | 103 | 70 |
| 27 | Septicaemia | 169 | 121 | 153 | 190 | 157 | 121 | 125 | 129 | 94 | 113 | 80 | 52 |
| 28 | Liver Diseases | 161 | 115 | 109 | 121 | 144 | 124 | 95 | 103 | 125 | 117 | 117 | 99 |

[Plate 498.]

## MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

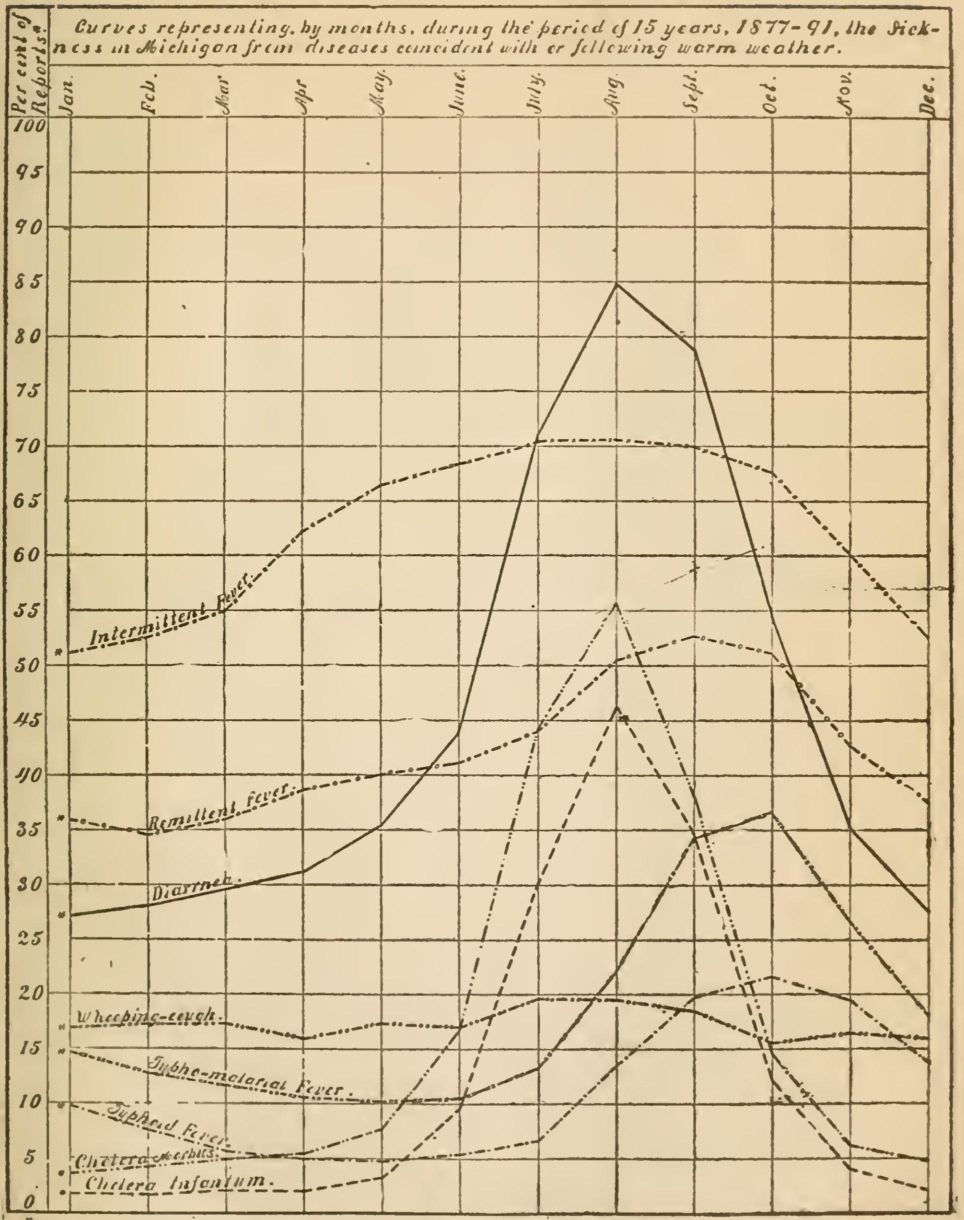
*No. 1.—Relative importance of, and Fluctuations in the Reported Mortality from each of the twenty-eight greatest Causes and Conditions of Deaths in Michigan, during the ten years 1881–90.*



[Plate 499.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

## NO. 2.- WARM-WEATHER DISEASES IN MICHIGAN.

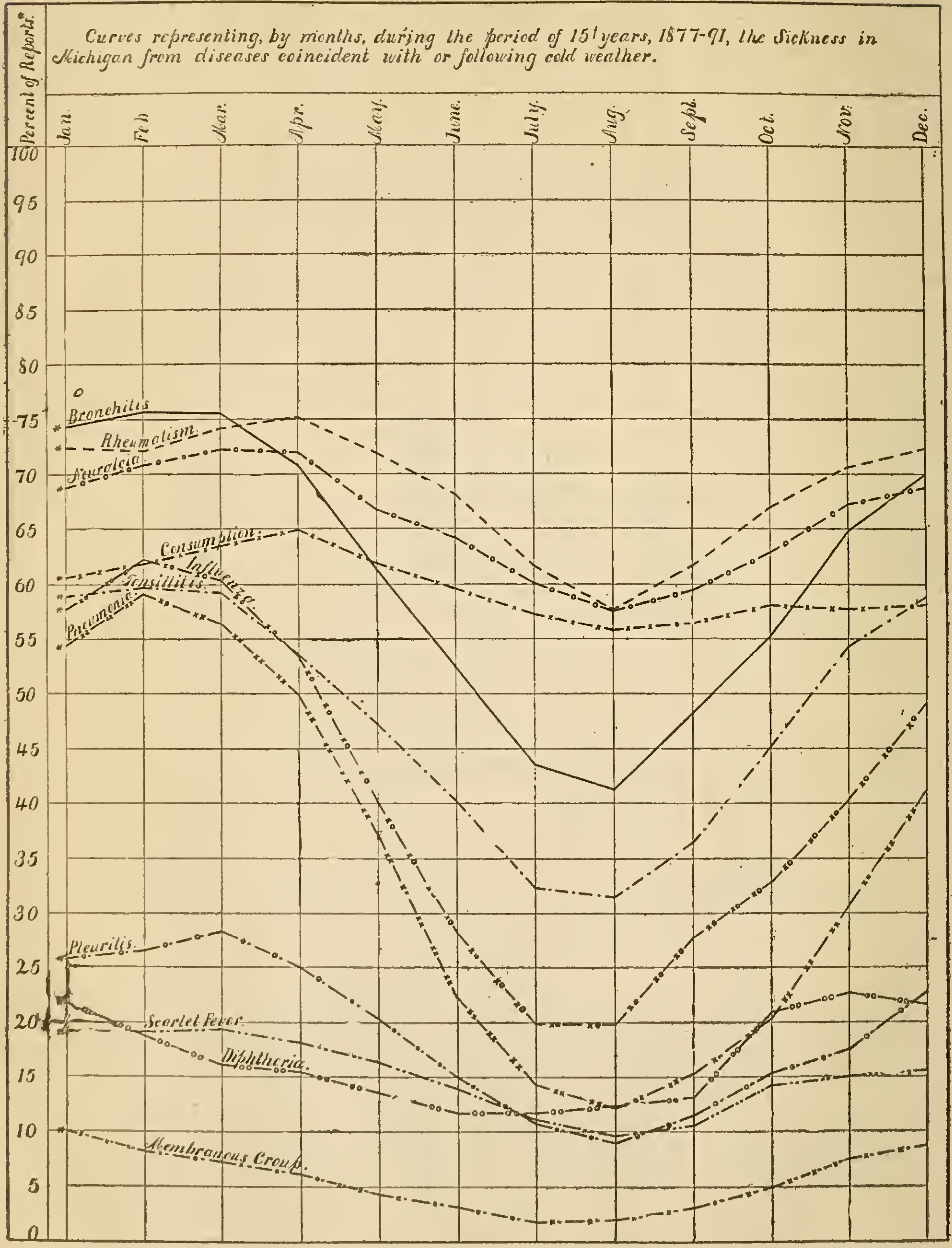


*Indicating what per cent of all reports received stated the presence of the diseases named then under the observation of the physicians reporting.
Relative to each disease, over 63,000 weekly reports are represented in this diagram.

[Plate 500.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT

.NO.3.—COLD-WEATHER DISEASES IN MICHIGAN.

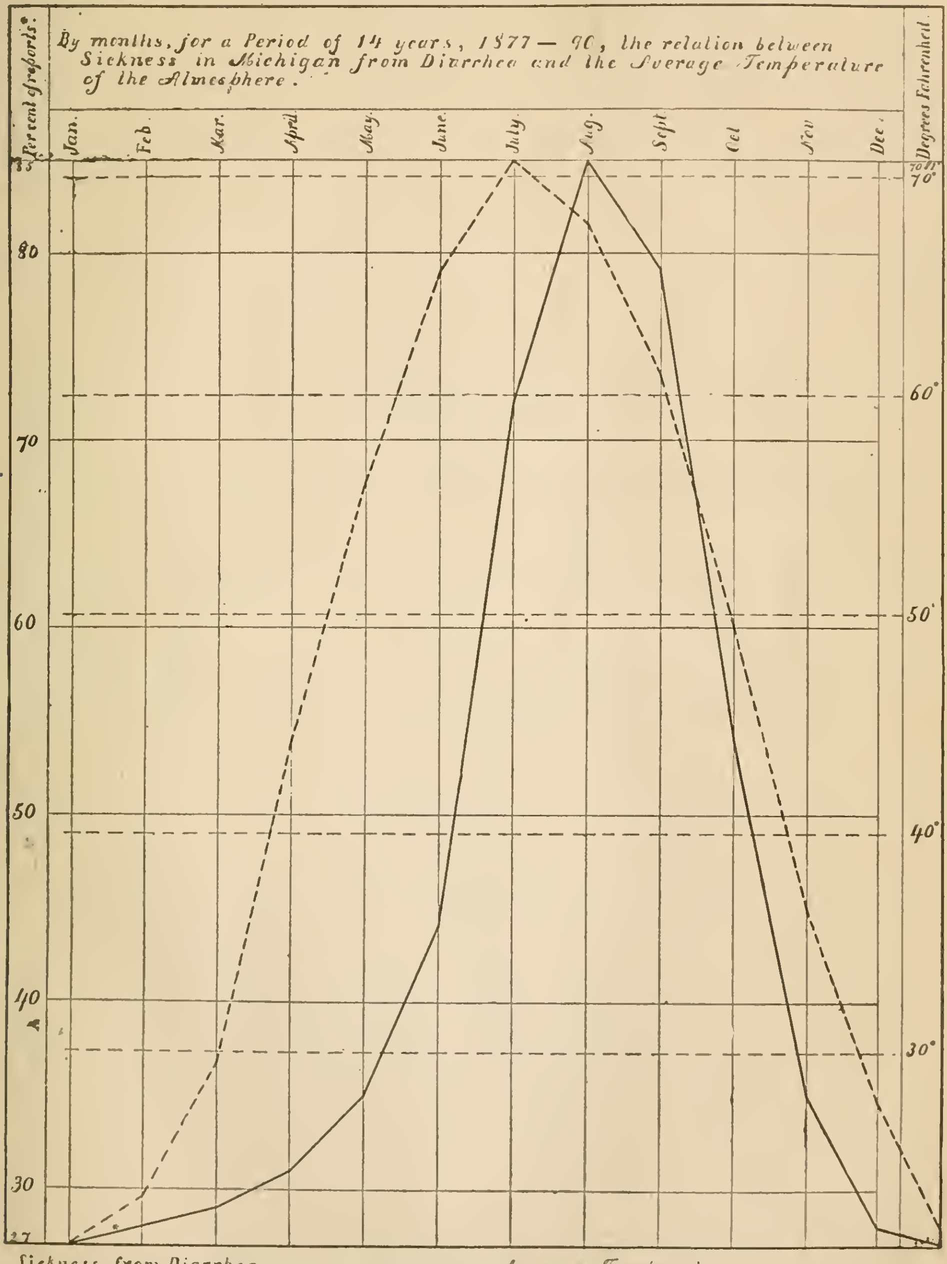

Curves representing, by months, during the period of 15[1] years, 1877-91, the Sickness in Michigan from diseases coincident with or following cold weather.

*Indicating what per cent of all reports received stated the presence of each disease then under the observation of the physicians reporting. Relative to bronchitis, pneumonia, membranous croup, diphtheria, influenza, scarlatina and rheumatism, over 63,000 weekly reports, relative to neuralgia and tonsillitis over 57,000, relative to consumption over 60,000, and relative to pleuritis over 19,000 weekly reports of sickness are represented in this diagram.* [1]*Consumption for only 14 years, tonsillitis and neuralgia for only 13 years, pleuritis for only 4 years.*

[Plate 501.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

## NO.4.—ATMOSPHERIC TEMPERATURE, AND SICKNESS FROM DIARRHEA, IN MICHIGAN.



*Sickness from Diarrhea* ———————. *Average Temperature* - - - - - - - - -.

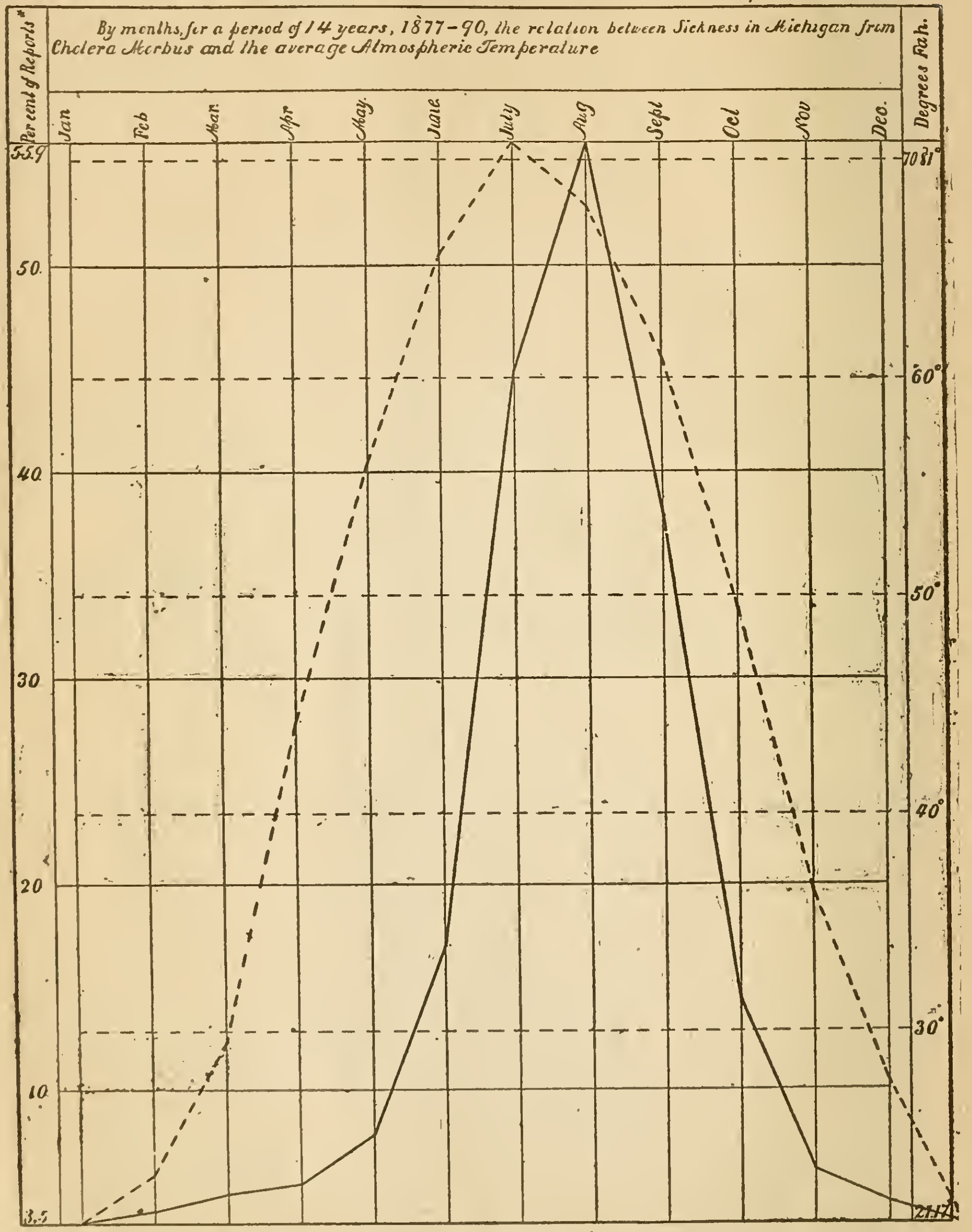
**Indicating what per cent of all reports received stated the presence of Diarrhea then under the observation of the physicians reporting.*

*Over 57,000 weekly reports of sickness, and over 256,000 observations of the atmospheric temperature are represented in this diagram*

[Plate 502.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT

## NO.5.-ATMOSPHERIC TEMPERATURE, AND SICKNESS FROM CHOLERA MORBUS IN MICHIGAN.


*By months, for a period of 14 years, 1877–90, the relation between Sickness in Michigan from Cholera Morbus and the average Atmospheric Temperature*

*Sickness from Cholera Morbus* ———————. *Average Temperature* — — — — — — — —.

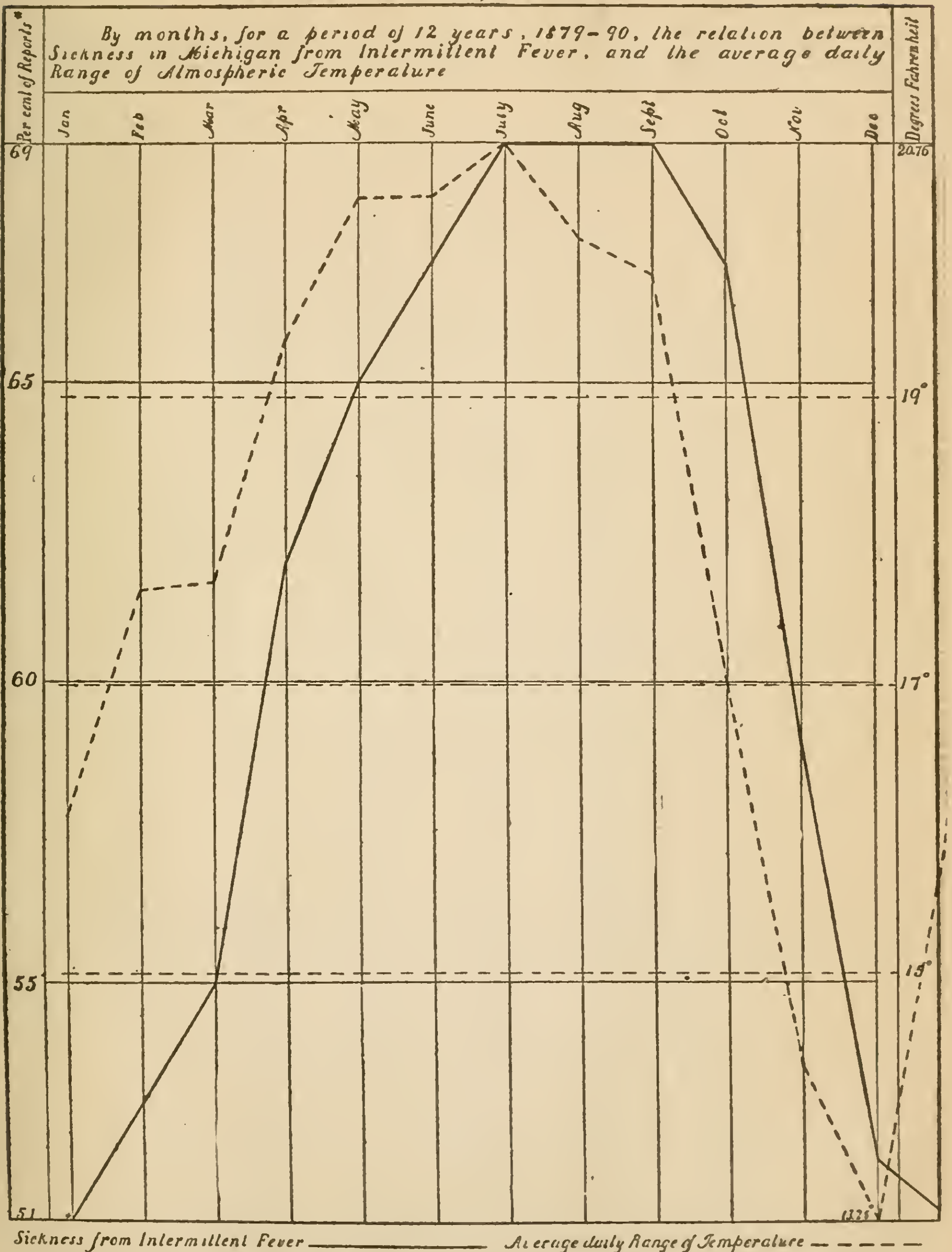
* *Indicating what per cent of all reports received stated the presence of cholera morbus then under the observation of the physicians reporting.*

*Over 59,000 weekly reports of sickness, and over 256,000 observations of the atmospheric temperature are represented in this diagram.*

[Plate 503.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

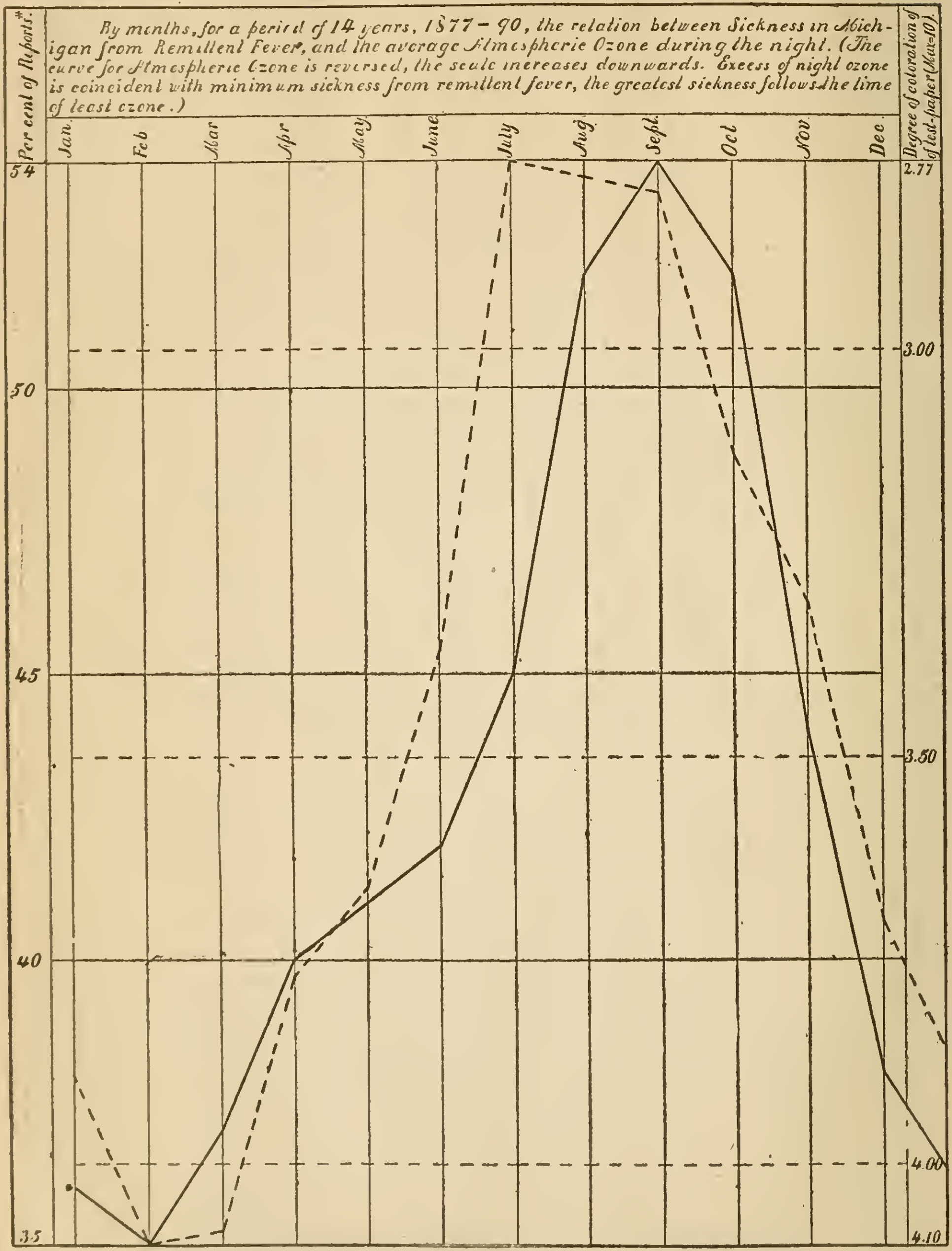
## NO.6.-DAILY RANGE OF ATMOSPHERIC TEMPERATURE, AND SICKNESS FROM INTERMITTENT FEVER, IN MICHIGAN.



*Indicating what per cent of all reports received stated the presence of Intermittent Fever then under the observation of the physicians reporting

Over 53,000 weekly reports of sickness, and over 60,000 observations of the average daily range of atmospheric temperature are represented in this diagram

## NO.7.- ATMOSPHERIC OZONE, AND SICKNESS FROM REMITTENT FEVER, IN MICHIGAN



By months, for a period of 14 years, 1877 – 90, the relation between Sickness in Michigan from Remittent Fever*, and the average Atmospheric Ozone during the night. (The curve for Atmospheric Ozone is reversed, the scale increases downwards. Excess of night ozone is coincident with minimum sickness from remittent fever, the greatest sickness follows the time of least ozone.)

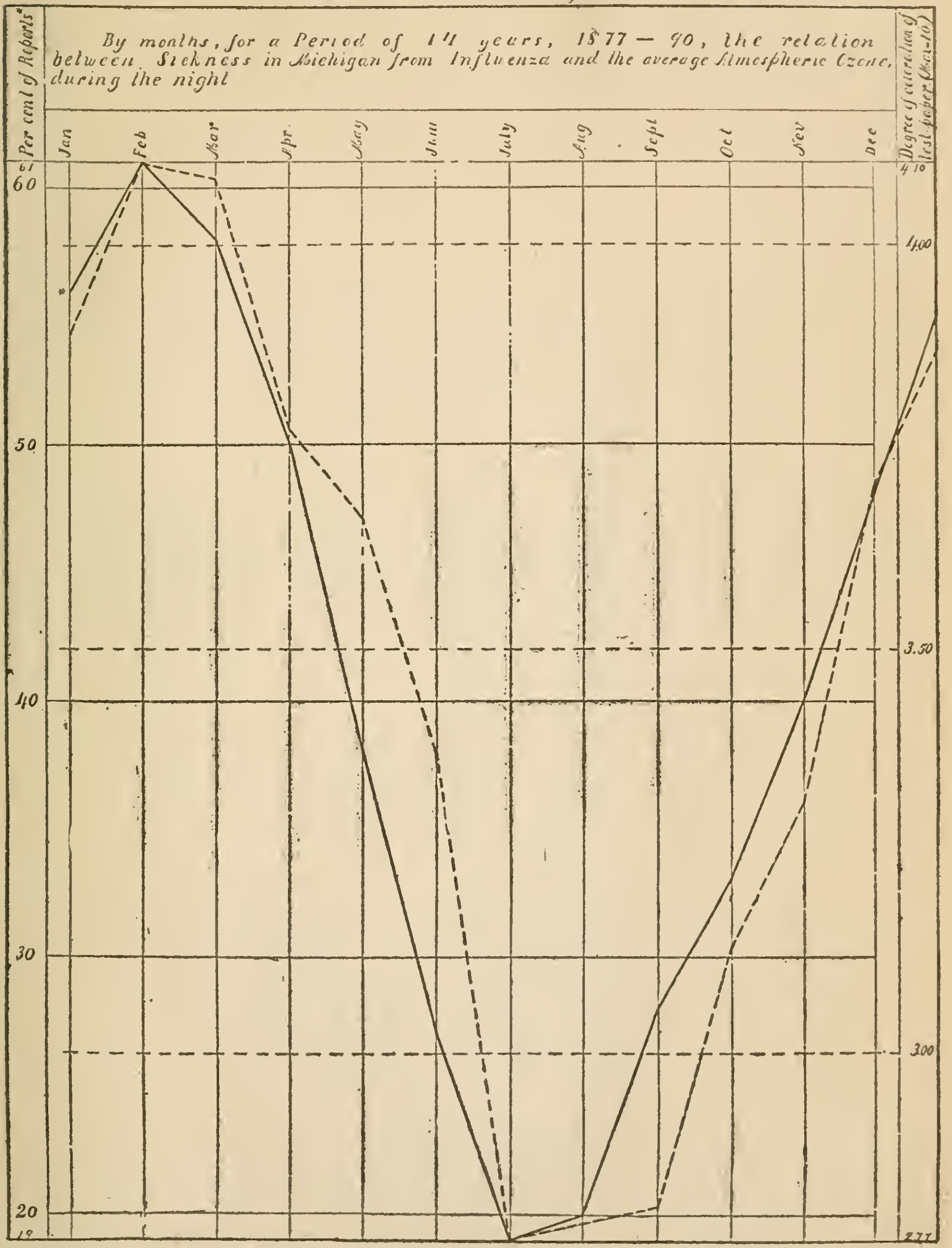
Sickness from Remittent Fever ——————. Atmospheric Ozone, Night – – – – – – – – –.

*Indicating what per cent of all reports received stated the presence of remittent fever then under the observation of the physicians reporting.

Over 59,000 weekly reports of sickness and over 69,000 observations of atmospheric ozone are represented in this diagram.

[Plate 505.]

NO. 8.—ATMOSPHERIC OZONE, AND SICKNESS FROM INFLUENZA, IN MICHIGAN.



By months, for a Period of 14 years, 1877—90, the relation between Sickness in Michigan from Influenza and the average Atmospheric Ozone, during the night

Sickness from Influenza ————————. Atmospheric Ozone, Night — — — — . .

*Indicating what per cent of all reports received stated the presence of Influenza then under the observation of the physicians, reporting:

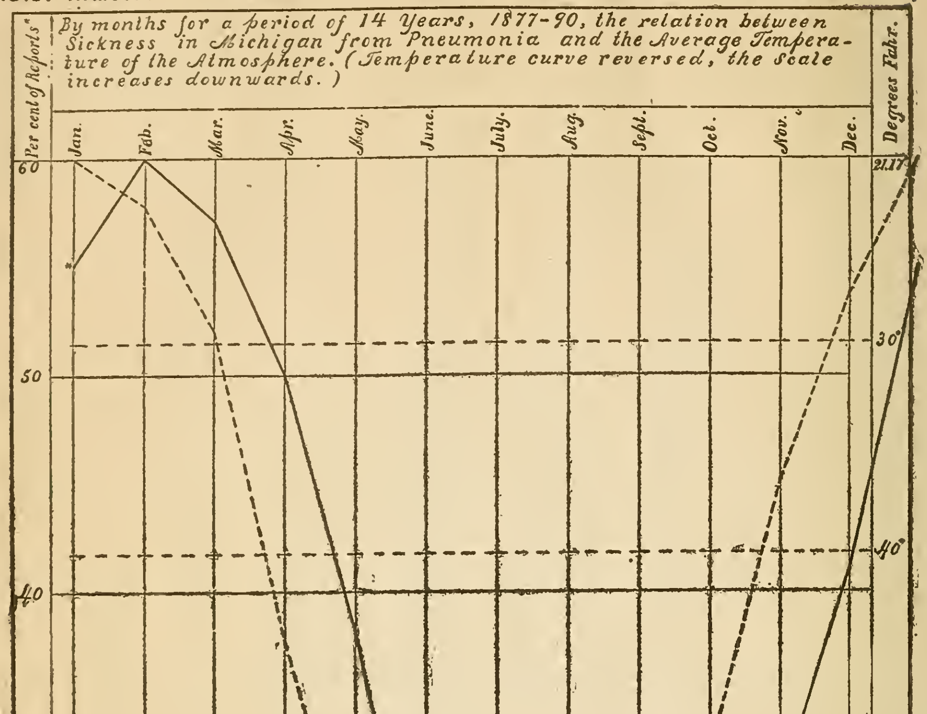
Over 59,000 weekly reports of sickness, and over 69,000 observations of atmospheric ozone are represented in this diagram.

[Plate 506.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

## NO.9.- ATMOSPHERIC TEMPERATURE, AND SICKNESS FROM PNEUMONIA IN MICHIGAN.

*By months for a period of 14 Years, 1877-90, the relation between Sickness in Michigan from Pneumonia and the Average Temperature of the Atmosphere. (Temperature curve reversed, the Scale increases downwards.)*



*Sickness from Pneumonia* ——— *Average Temperature* - - - - -

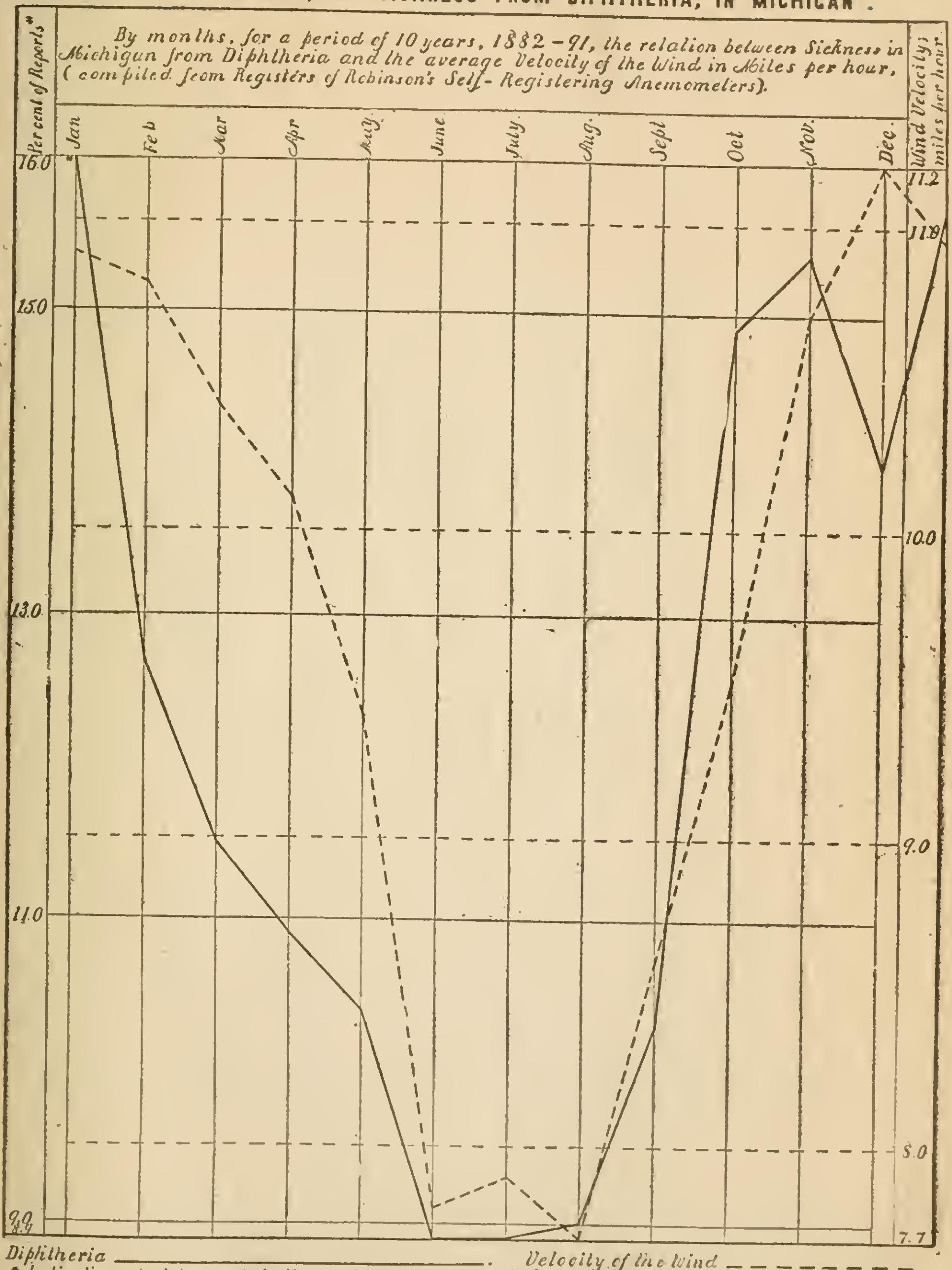
**Indicating what per cent of all reports received stated the presence of pneumonia then under the observation of the physicians reporting.*

*Over 59,000 weekly reports of sickness, and over 256,000 observations of the atmospheric temperature are represented in this diagram.*

[Plate 507.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

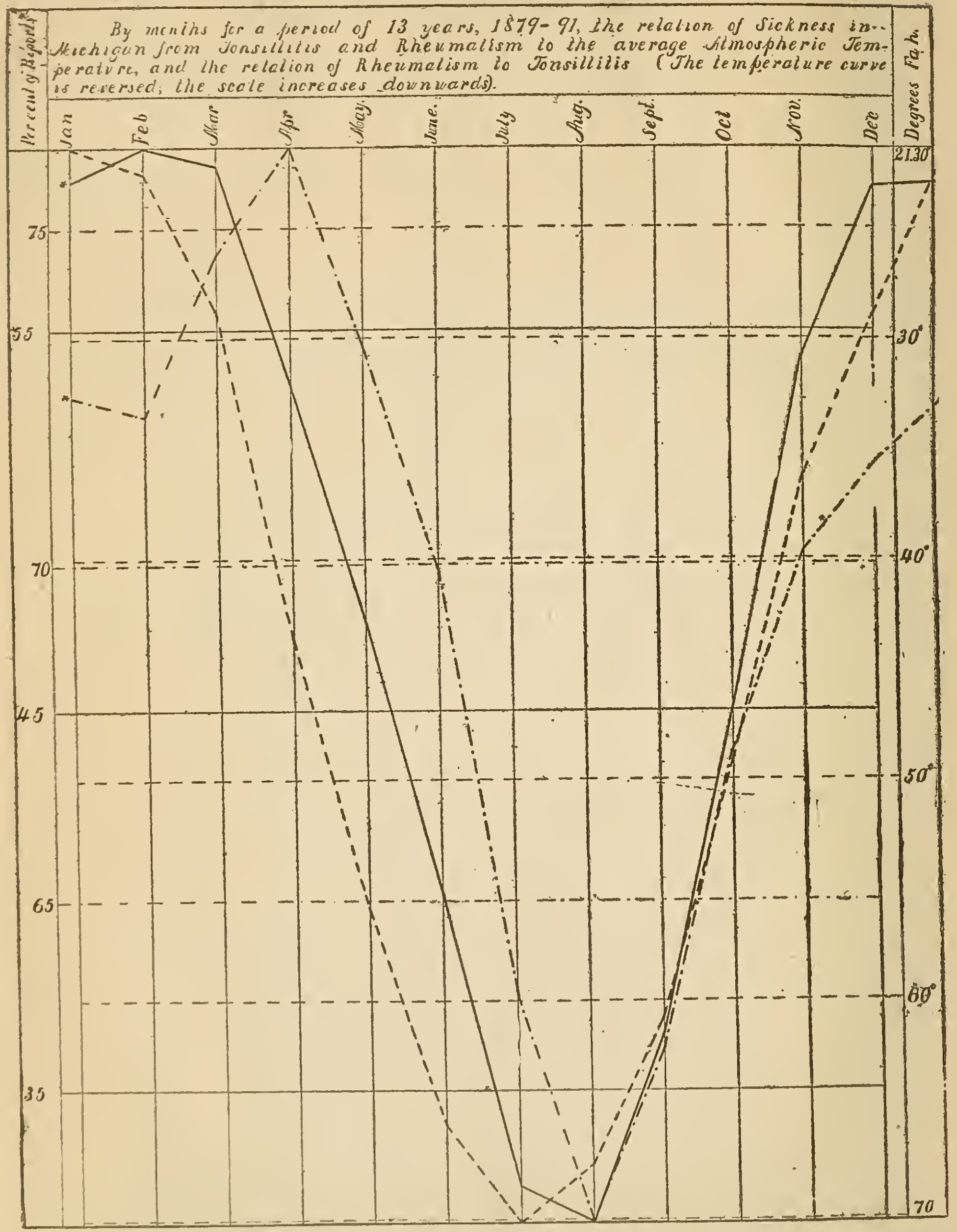
## NO.10.-VELOCITY OF THE WIND, AND SICKNESS FROM DIPHTHERIA, IN MICHIGAN.


By months, for a period of 10 years, 1882-91, the relation between Sickness in Michigan from Diphtheria and the average Velocity of the Wind in Miles per hour, (compiled from Registers of Robinson's Self-Registering Anemometers).

* Indicating what per cent of all reports received stated the presence of diphtheria then under the observation of the physicians reporting. Over 46,000 weekly reports of sickness, and constant registers of the wind nearly every hour of every day during ten years at 8 stations in Michigan are represented in this diagram.

[1] Because diphtheria is a contagious disease of children, the general opening of schools from about the first Monday in September to the first Monday in November probably unusually increases the sickness from diphtheria in October and November.

NO. 11.—TONSILLITIS FOLLOWS TEMPERATURE; RHEUMATISM FOLLOWS TONSILLITIS.



By months for a period of 13 years, 1879–91, the relation of Sickness in Michigan from Tonsillitis and Rheumatism to the average Atmospheric Temperature, and the relation of Rheumatism to Tonsillitis (The temperature curve is reversed; the scale increases downwards).

Atmospheric Temperature — — — — —. Tonsillitis ————————. Rheumatism —·—·—·—
†Scale for Rheumatism ‡Scale for Tonsillitis

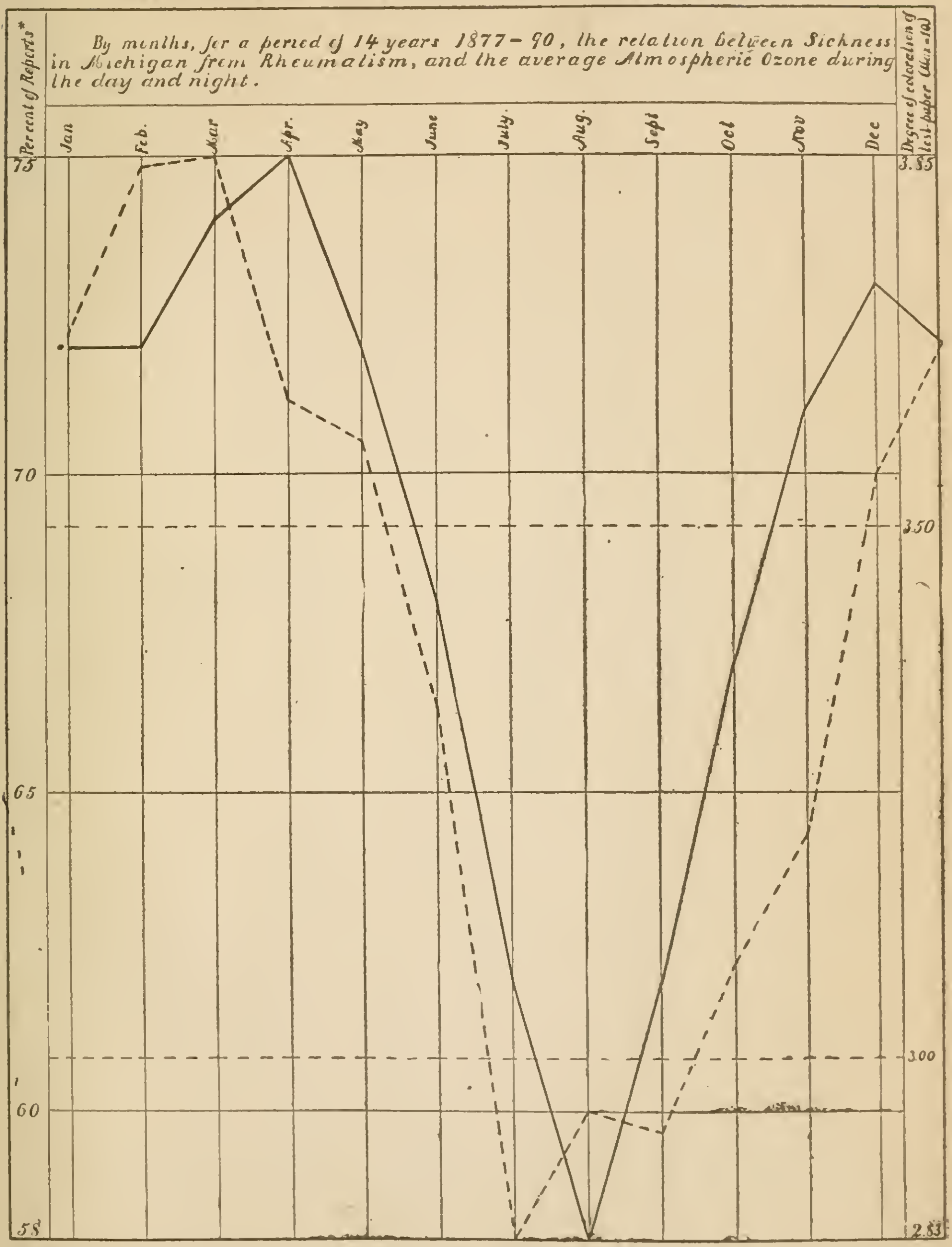
*Indicating what per cent of all reports received stated the presence of tonsillitis and rheumatism then under the observation of the physicians reporting.

Over 57,000 weekly reports of sickness, and over 268,000 observations of the atmospheric temperature are represented in this diagram.

[Plate 509.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

## NO.12.- ATMOSPHERIC OZONE, AND SICKNESS FROM RHEUMATISM, IN MICHIGAN.



By months, for a period of 14 years 1877–90, the relation between Sickness in Michigan from Rheumatism, and the average Atmospheric Ozone during the day and night.

Sickness from Rheumatism ———————— Atmospheric Ozone, day and night – – – – – – – –

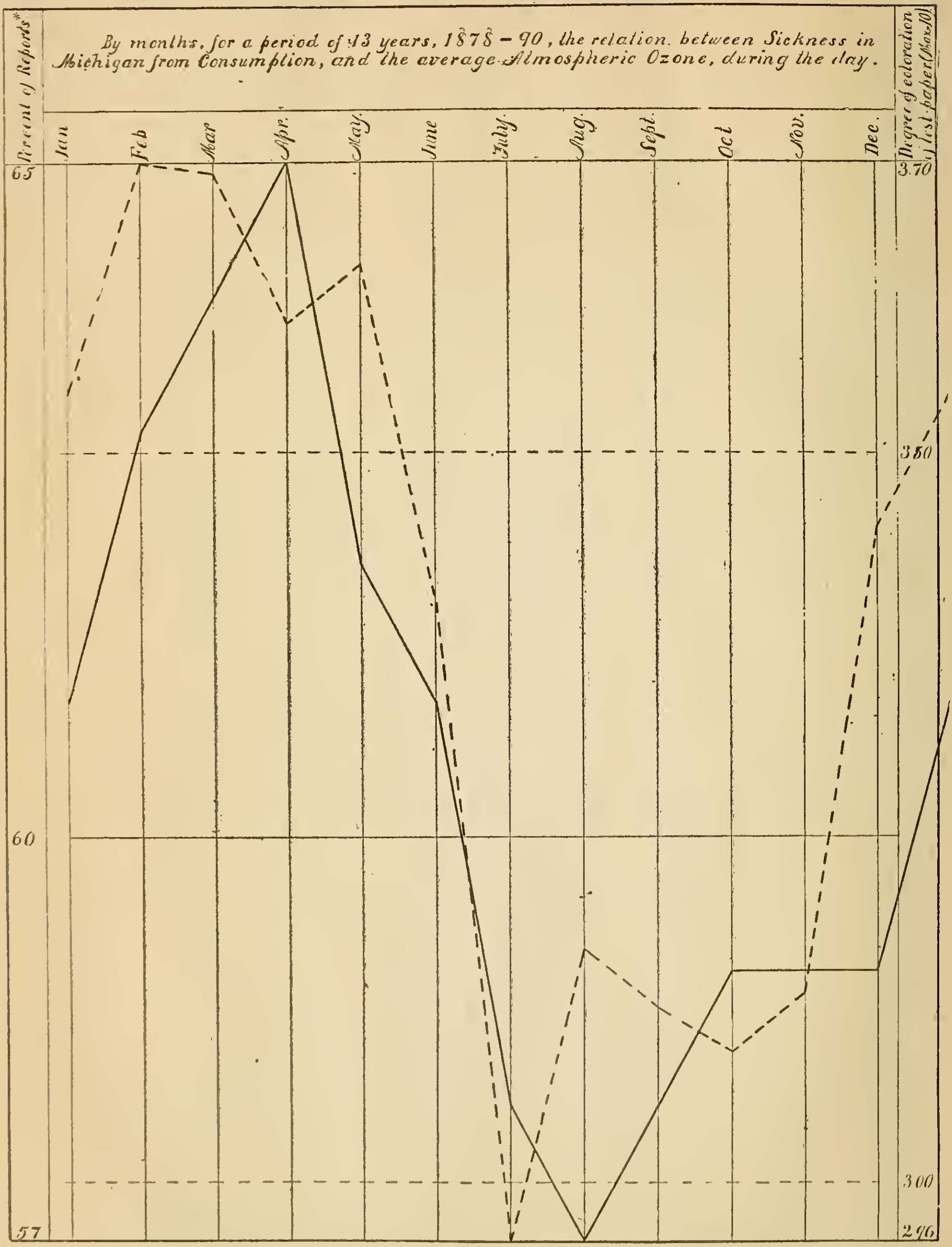
* Indicating what per cent of all reports received stated the presence of Rheumatism then under the observation of the physicians reporting.

Over 57,000 weekly reports of sickness, and over 138,000 observations of atmospheric ozone are represented in this diagram.

[Plate 510.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

## NO.13.- ATMOSPHERIC OZONE, AND SICKNESS FROM CONSUMPTION, IN MICHIGAN.


*By months, for a period of 13 years, 1878 – 90, the relation between Sickness in Michigan from Consumption, and the average Atmospheric Ozone, during the day.*

*Sickness from Consumption* ————————. *Atmospheric Ozone, day* — — — — — — — — —.

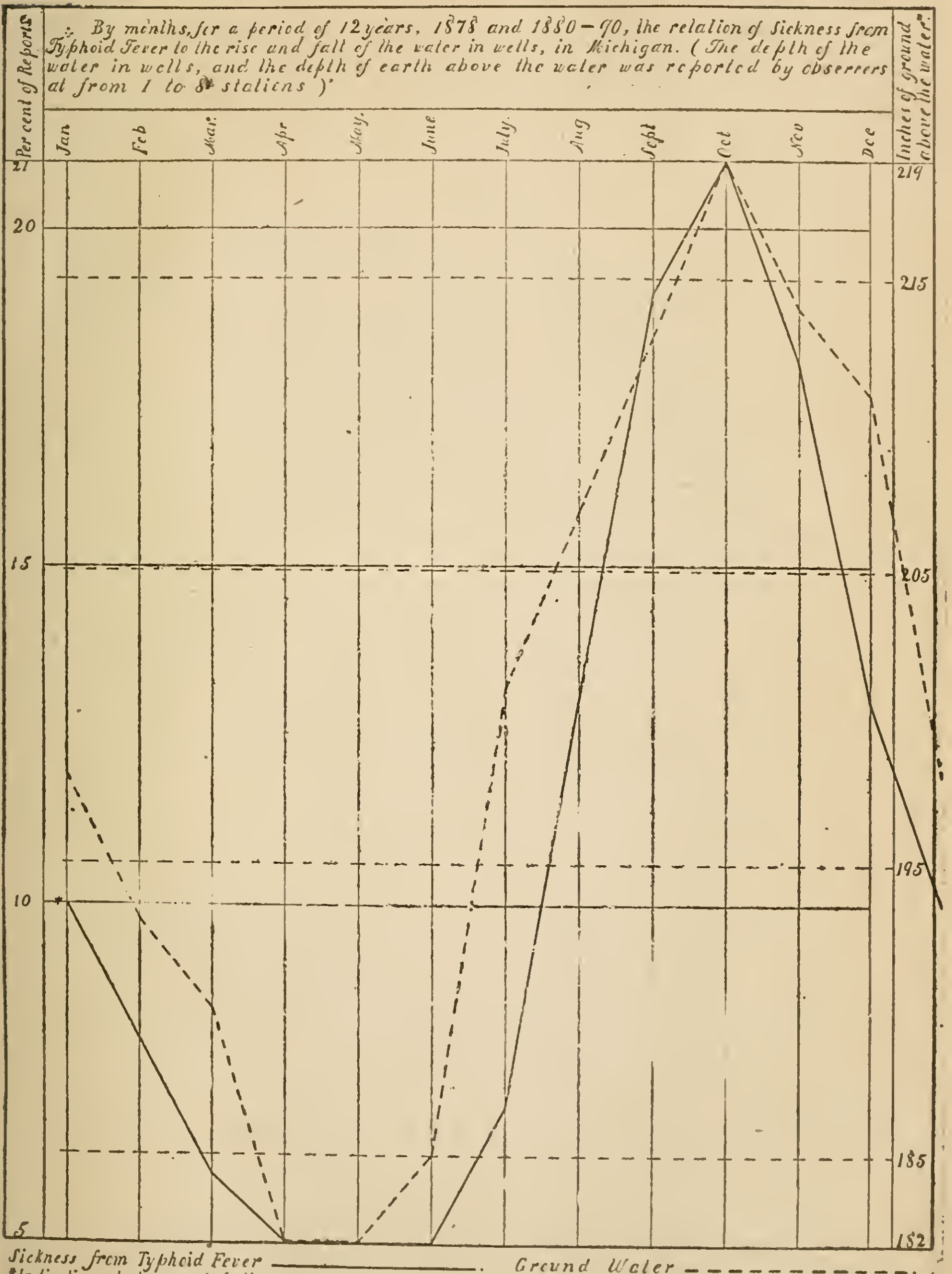
**Indicating what per cent of all reports received stated the presence of consumption then under the observation of the physicians reporting.*

*Over 56.000 weekly reports of sickness, and over 69.000 observations of atmospheric ozone are represented in this diagram.*

[Plate 511.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT.

## LOW WATER IN WELLS, AND SICKNESS FROM TYPHOID FEVER, IN MICHIGAN.



∴ By months, for a period of 12 years, 1878 and 1880–90, the relation of Sickness from Typhoid Fever to the rise and fall of the water in wells, in Michigan. (The depth of the water in wells, and the depth of earth above the water was reported by observers at from 1 to 8† stations)

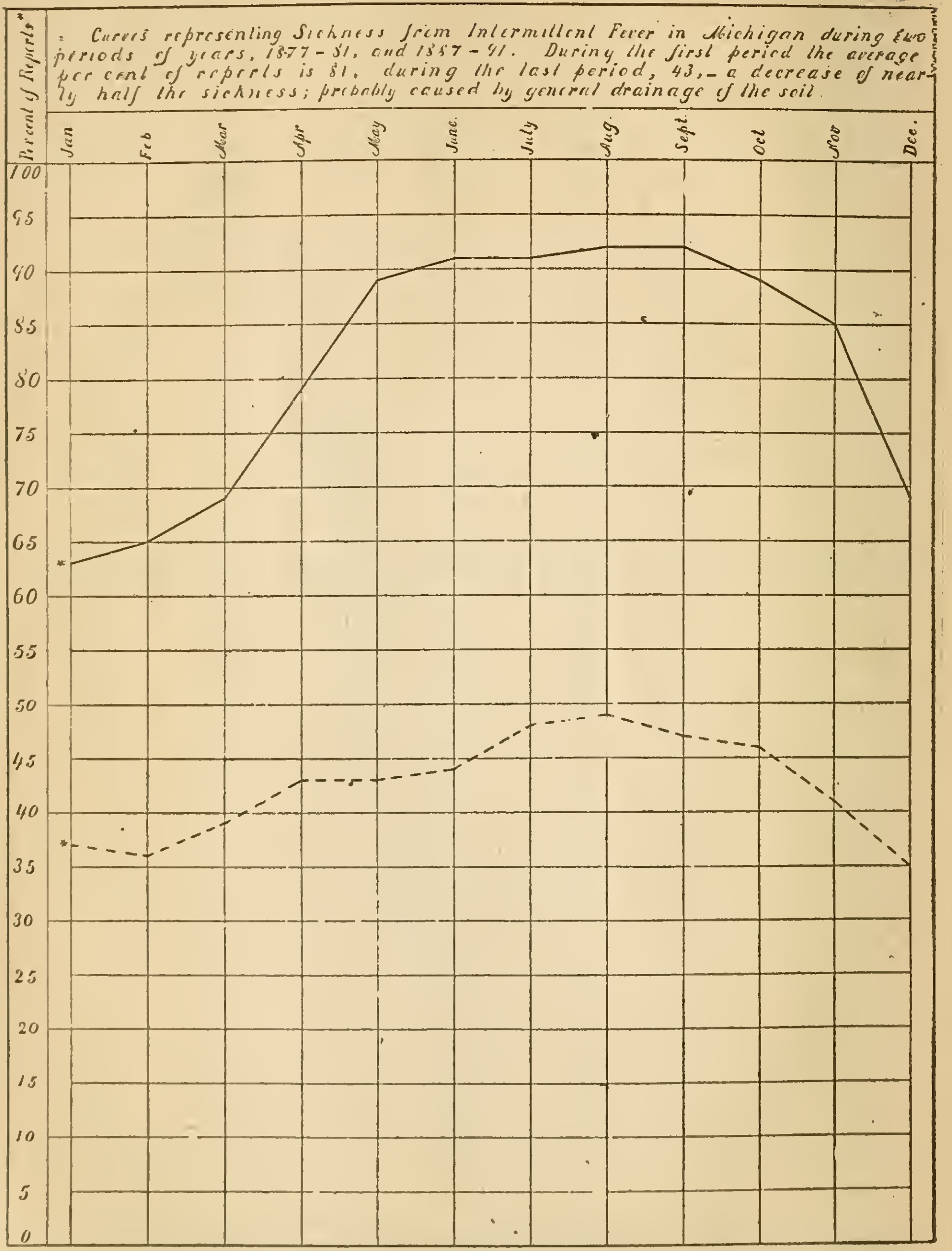
*Indicating what per cent of all reports received stated the presence of Typhoid Fever then under the observation of the physicians reporting

† Over 33000 weekly reports of sickness, and over 500 observations of the depth of water in wells are represented in this diagram.

NOTE.— The danger from typhoid fever appears to be greatest in October, when the water in wells is lowest, that is, when there are the most "Inches of earth above the ground-water." The danger is least in May, when the water in wells is highest.

[Plate 512.]

## NO. 15.—DECREASE OF SICKNESS FROM INTERMITTENT FEVER, IN MICHIGAN.


Curves representing Sickness from Intermittent Fever in Michigan during two periods of years, 1877-81, and 1887-91. During the first period the average per cent of reports is 81, during the last period, 43,—a decrease of nearly half the sickness; probably caused by general drainage of the soil.

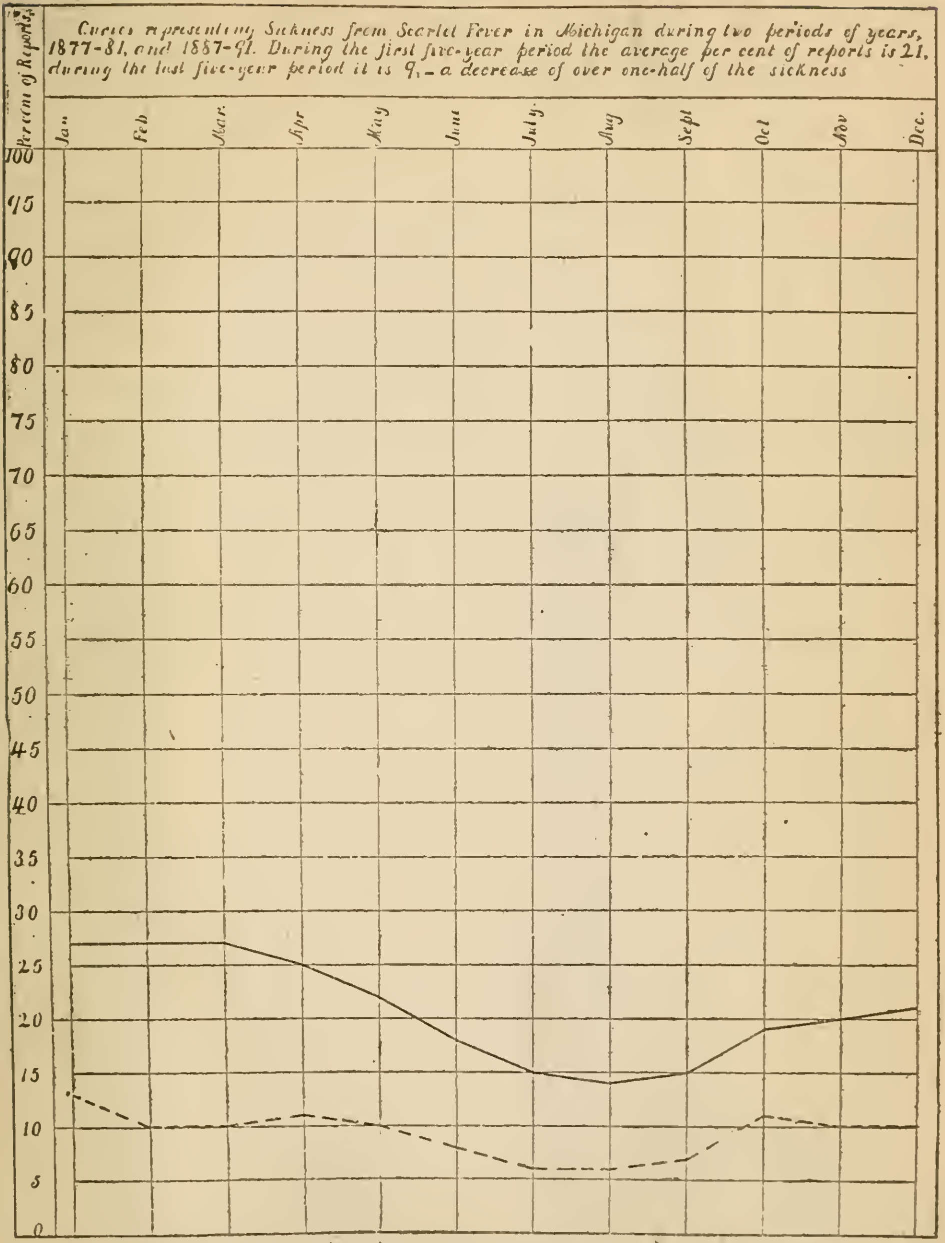
Sickness from Intermittent Fever, 5 years, 1877-81 ———. Sickness from Intermittent Fever, 5 years, 1887-91 — — — —.

* Indicating what per cent of all reports received stated the presence of Intermittent Fever then under the observation of the physicians reporting.

Over 17,000 weekly reports of sickness were received for the first period, and over 24,000 for the last period.

[Plate 513]

## NO. 16.- DECREASE OF SICKNESS FROM SCARLET FEVER, IN MICHIGAN.



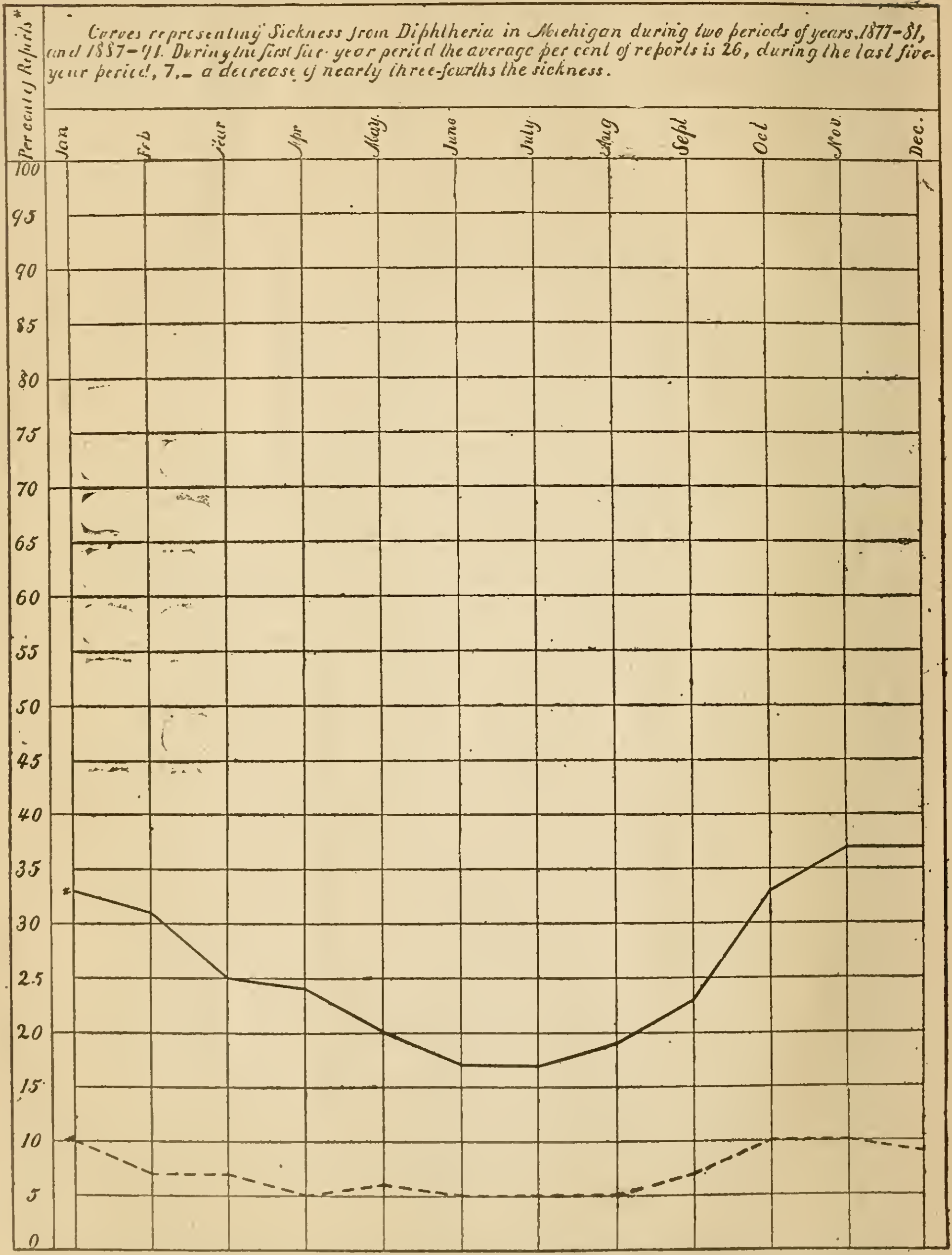
Curves representing Sickness from Scarlet Fever in Michigan during two periods of years, 1877-81, and 1887-91. During the first five-year period the average per cent of reports is 21, during the last five-year period it is 9, - a decrease of over one-half of the sickness

Sickness from Scarlet Fever, 5 years. 1877-81 ———. Sickness from Scarlet Fever, 5 years, 1887-91 - - - -
*Indicating what per cent of all reports received stated the presence of scarlet fever then under the observation of the physicians reporting.
Over 17,000 weekly reports of sickness were received for the first period, and over 24,000 for the last period.

[Plate 514.]

MICHIGAN STATE BOARD OF HEALTH EXHIBIT

## NO. 17.- DECREASE OF SICKNESS FROM DIPHTHERIA, IN MICHIGAN.



Curves representing Sickness from Diphtheria in Michigan during two periods of years, 1877–81, and 1887–91. During the first five-year period the average per cent of reports is 26, during the last five-year period, 7,— a decrease of nearly three-fourths the sickness.

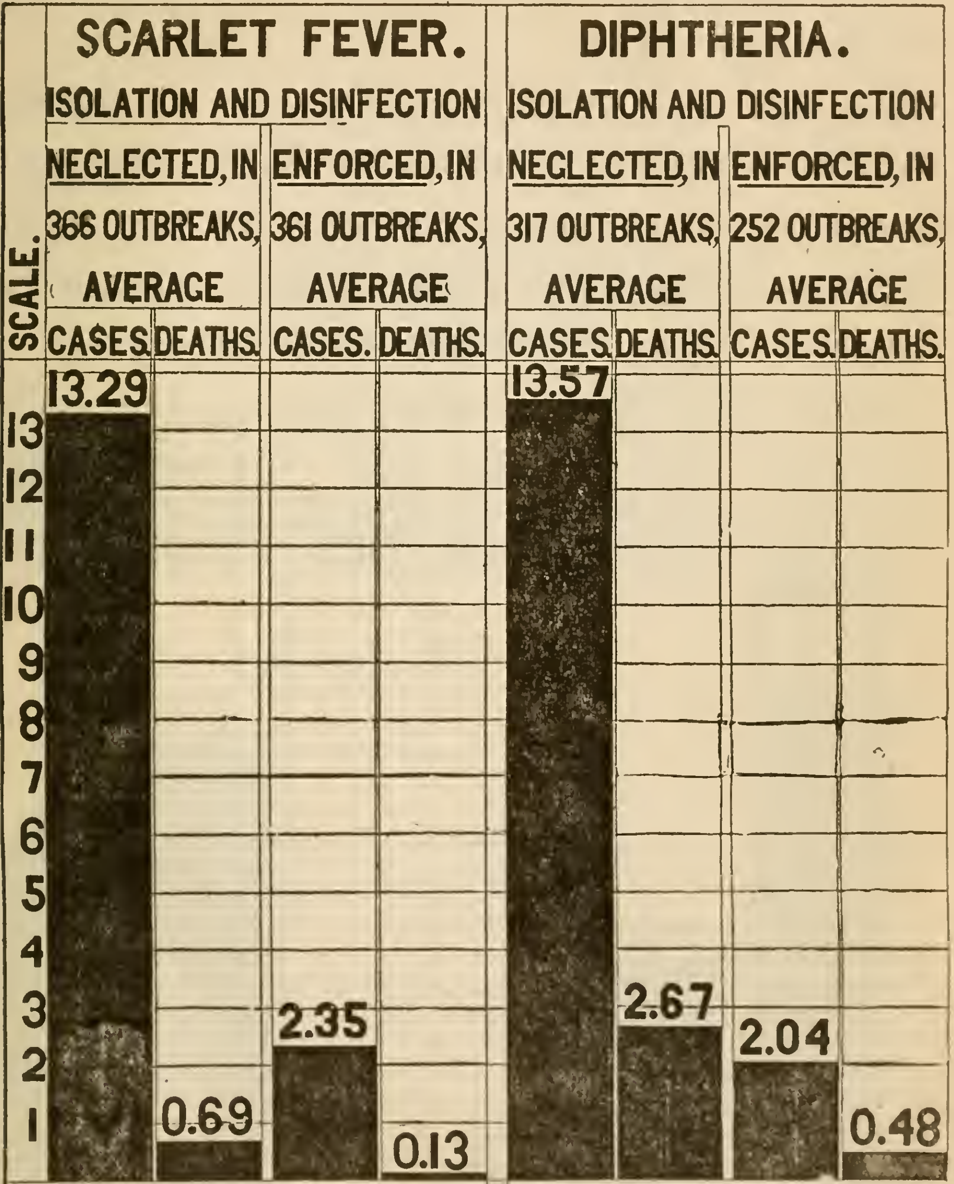
Sickness from Diphtheria, 5 years, 1877–81 ————. Sickness from Diphtheria, 5 years, 1887–91 — — —.

*Indicating what per cent of all reports received stated the presence of diphtheria then under the observation of the physicians reporting.

Over 17,000 weekly reports of sickness were received for the first period, and over 24,000 for the last period.

[Plate 515.]

# ISOLATION AND DISINFECTION RESTRICTED SCARLET FEVER AND DIPHTHERIA IN MICHIGAN DURING THE 5 YEARS 1886-90.



TOTALS; OUTBREAKS, 1,857*; CASES, 11,312; DEATHS, 591

INDICATED SAVING OF CASES 13.29 X 1,857 - 11,312 = 13,368

INDICATED SAVING OF LIVES .69 X 1,857 - 591 = 690

*Includes Outbreaks not clearly "Neglected" or "Enforced"

TOTALS, OUTBREAKS, 1,985, CASES, 11,634, DEATHS, 2,570

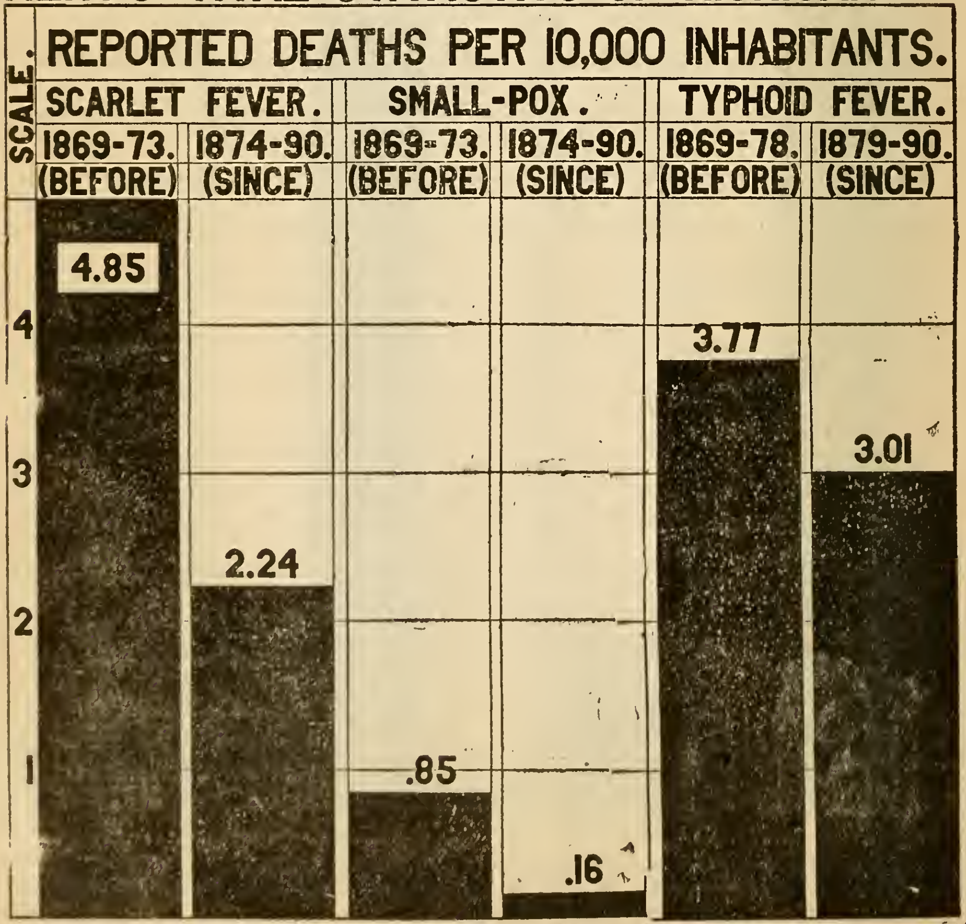
INDICATED SAVING OF CASES 13.57 X 1,985 - 11,634 = 15,302

INDICATED SAVING OF LIVES 2.67 X 1,985 - 2,570 = 2.732

[illegible]

[Plate 516.]

# LIVES SAVED BY PUBLIC-HEALTH WORK. COMPARISON OF DEATH-RATES IN MICHIGAN FROM SCARLET FEVER AND SMALL-POX BEFORE AND SINCE THE STATE BOARD OF HEALTH WAS ESTABLISHED AND FROM TYPHOID FEVER BEFORE AND SINCE ITS RESTRICTION WAS UNDERTAKEN BY THE STATE BOARD. COMPILED FROM STATE DEPARTMENT'S "VITAL STATISTICS" OF MICHIGAN.



LIVES SAVED FROM: SCARLET FEVER (17 YEARS) 7,268; SMALL-POX (17 YEARS) 1,921; TYPHOID FEVER (12 YEARS) 1,671.

Designed and drawn by [illegible] under the supervision of Henry B. Baker.

[Plate 517.]

It appears that the judge on this exhibit was the veteran sanitarian, John H. Rauch, M. D., ex-Secretary of the Illinois State Board of Health, and ex-President of the American Public Health Association.

Notice of the award was received from Washington, as follows:—

# World's Columbian Commission

## EXECUTIVE COMMITTEE ON AWARDS.

JOHN BOYD THACHER, Chairman, Albany, N. Y.
W. J. SEWELL, New Jersey. A. T. BRITTON, District Columbia.
A. B. ANDREWS, North Carolina.
B. B. SMALLEY, Ex-Officio Member, Burlington, Vt.

BUREAU:
PACIFIC BUILDING,
622 F ST., WASHINGTON, D. C.

*Washington, D. C., March 20, 1894.*

DEAR SIR:—I herewith inclose you an official copy of your Award which, in due time, will be inscribed in the Diploma and forwarded to your present address, unless otherwise indicated by you.

Yours,
JOHN BOYD THACHER,
*Chairman Executive Committee on Awards.*

---

## UNITED STATES.

A. Department L.—Liberal Arts. 2244

*Exhibitor*—State Board of Health.
*Address*—Lansing, Mich.
*Group*—147.
*Class*—833.
*Exhibit*—Reports and Diagrams.

## AWARD

For completeness, exactness and statistical value.

*Signed,*
JOHN H. RAUCH,
*Individual Judge.*

*Approved:*
DR. K. BUENZ,
*President Departmental Committee.*

*Approved:*
JOHN BOYD THACHER,
*Chairman Executive Committee on Awards.*

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# THE CAUSATION OF INFLUENZA AND ALLIED DISEASES, WITH SUGGESTIONS FOR THEIR PREVENTION.*

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Influenza is of sufficient importance, by itself, to warrant the devotion to it of great effort and long-continued study; but that is not the only nor even the chief reason why it is worthy of extraordinary exertions to learn its causation, modes of spreading, concomitants and sequelæ.

The great importance of epidemic influenza is generally conceded. It is understood also that much of the importance of the subject is because several of our most important diseases are so allied to influenza that they are increased by the influenza or by the same conditions which favor the increase of that disease. Some observers go so far as to state that the mortality from all diseases is increased by epidemic influenza, and all agree that either influenza or the epidemic influence connected with it increases the mortality from many diseases.

The diseases which are most noticeably increased are the diseases of the lungs and air-passages, the immediate mortality being greatest from bronchitis and pneumonia. Thus, for instance, during the recent epidemic, the deaths in Paris, France, by acute diseases of the respiratory passages, during the first week in 1890 were 977, instead of 155 in the corresponding week in 1889,† an increase of 822 deaths from these diseases in a single week or more than six times as many deaths as when the epidemic was not present. Phthisis caused 465 deaths, instead of 169, an increase of 296—or nearly three times as many deaths as when the epidemic was not present. My belief is, however, that not all of the great increase in phthisis by reason of the epidemic is usually apparent in the immediate death-rate. Many contract pulmonary consumption but do not die until a year or two later.

For its bearing upon the subject of the causation of influenza and allied diseases, as well as showing the importance of the late epidemic, I quote from the Bulletin of the N. Y. State Board of Health for January 1890, relative to cities and towns, in that State, as follows:—"The mortality for January is over sixty per cent * * greater than the average during the past five years in this month. * * The increase has been due to the remarkable occurrence of epidemic influenza, which began in December. Only a few hundred deaths have been certified to from this cause directly. It has shown itself in a large mortality from all local diseases. The number of deaths from acute respiratory diseases is about three times greater than the average in January, and from diseases of the nervous, circulatory and digestive systems there is an increase of from thirty-seven to forty per cent. Consumption shows an increase of seventy per cent, deaths from old age are increased, and from unclassified causes they are nearly doubled."*

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* A paper read, in part, before the Section on State Medicine, of the American Medical Association at its meeting in Nashville, Tenn., in May, 1890. The paper has never been published, the author having been unwilling to permit its publication in the "Journal" of the Association without the diagrams which supply so much of the evidence on which conclusions are based.

† Review de Hygiene, Jan. 20, 1890, p. 5. Also British Medical Journal, Jan. 18, 1890, p. 146.

I believe that such a statement as the foregoing could not have been made relative to any epidemic of any other disease usually considered epidemic; it could not be true of yellow fever, cholera, small pox, diphtheria, typhoid fever, scarlet fever, or even measles; although in measles we have a disease that in some respects is allied to influenza.

### *Epidemic, Substantially the Same as Non-Epidemic Influenza.*

In Michigan about one hundred of the leading physicians in active general practice report each week the diseases under their observation. Such reports have been tabulated by months for many years including two in which influenza was epidemic, namely, 1879 and 1890. I exhibit to you diagrams showing curves of the increase and decrease of influenza in each and every month in each of the twelve years, 1877-1888; from which you will see that the epidemic of 1879 has the same sort of a curve as have other years, only in 1879 the disease was more than usually prevalent, over eighty per cent of all the reports in February 1879 having stated that influenza was under observation.† The diagram does not show the curve for 1889-90, but I have here a table (Exhibit 1) which shows that in this epidemic the curve rose rapidly, from 37 per cent of the weekly reports in December, 1889, to 92 per cent in January 1890, and reached its highest point in February during which month 95 per cent of all the weekly reports received stated the presence of influenza.‡ These observers reported it as "influenza," and from their reports, from the literature of the subject, and from my own observation and experience, I believe it to be substantially the same disease as the influenza which is present in Michigan in every month of every year. And that the influenza in Michigan during the recent epidemic was the same as in other parts of the world, I have no doubt.

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* This statement, and especially the last clause, has an important bearing upon the subject of this paper,—as to whether the causation of influenza is wholly by one specific micro-organism, by several micro-organisms, wholly by meteorological conditions, or whether, as seems most consistent with all the evidence, there is probably *one* micro-organism to which many of the effects known as influenza are due, and a *class* of micro-organisms the effects of which are increased by the same meteorological conditions which favor the one which causes influenza, and that of this "class" of micro-organisms, quite a large proportion of the diseases caused by them have not yet been definitely traced to their specific causes. This hypothesis seems to explain the fact quoted above in the last clause, from the Bulletin of the New York State Board of Health, that deaths from unclassified causes were nearly doubled; and this fact supplies a reason why the symptoms and effects attributed to influenza have been so numerous and various.

† These diagrams exhibiting on a single sheet the relations of atmospheric temperature to influenza in 144 consecutive months were exceedingly interesting for study, but they are not easily reduced so as to be available for book illustration, therefore, in publishing this paper, an effort is made to convey in even a more graphic manner the prominent idea to be derived from the original diagram of each and every one of the 144 months. This idea is to be gained by a study of the lines, in Diagram 2, page clxiv, which represent by months the *average* sickness from influenza and pneumonia during the twelve years, 1877-88, comparing those lines with the lines in Diagram 3, page clxv, which represent by months the sickness from influenza and pneumonia in the epidemic year 1879; from which it may be seen that in the epidemic year the influenza and the pneumonia sustain a relation to each other similar to that sustained in the non-epidemic years. In Diagram 3, also, there is shown, for the epidemic year 1879, the relations for both influenza and pneumonia to the atmospheric temperature, by which it is demonstrated that in the epidemic year, both of these diseases were, apparently, absolutely controlled by the temperature, even to the deviations from the regularity of the curves which occur in November, the deviations in both of the lines representing sickness, being nearly quantitatively similar to the deviation in the line representing the temperature.

‡ Diagram 4, page clxvi, copied from the Annual Report of the Secretary of the Michigan State Board of Health, exhibits this well, as also the great amount of sickness caused in 1890 by influenza, compared with a few other diseases. The line in this Diagram 4, representing influenza in an epidemic year, when compared with the line in Diagram 1, representing influenza in the twelve years, 1877-'88, demonstrates that, so far as relates to its rise and fall by seasons of the year, the epidemic influenza of 1890 was the same sort of a disease as the ordinary influenza reported in every month of the preceding series of years.

EXHIBIT 1.—*Per cent of weekly reports which stated the presence of Influenza in Michigan by months in 1889 and in 1890. (These weekly reports are made by physicians in active general practice in different parts of the State. Each report is strictly limited to the actual observation of the physician reporting.)*

| Months, 1889. | Per cent. | Months, 1890.* | Per cent. |
|---|---|---|---|
| January | 42 | January† | 92 |
| February | 44 | February† | 95 |
| March | 48 | March | 73 |
| April | 50 | April | 53 |
| May | 34 | May | 44 |
| June | 22 | June | 30 |
| July | 16 | July | 24 |
| August | 16 | August | 25 |
| September | 21 | September | 41 |
| October | 33 | October | 49 |
| November | 30 | November | 56 |
| December | 37 | December | 69 |
| Year, average | 32 | Year, average | 53 |

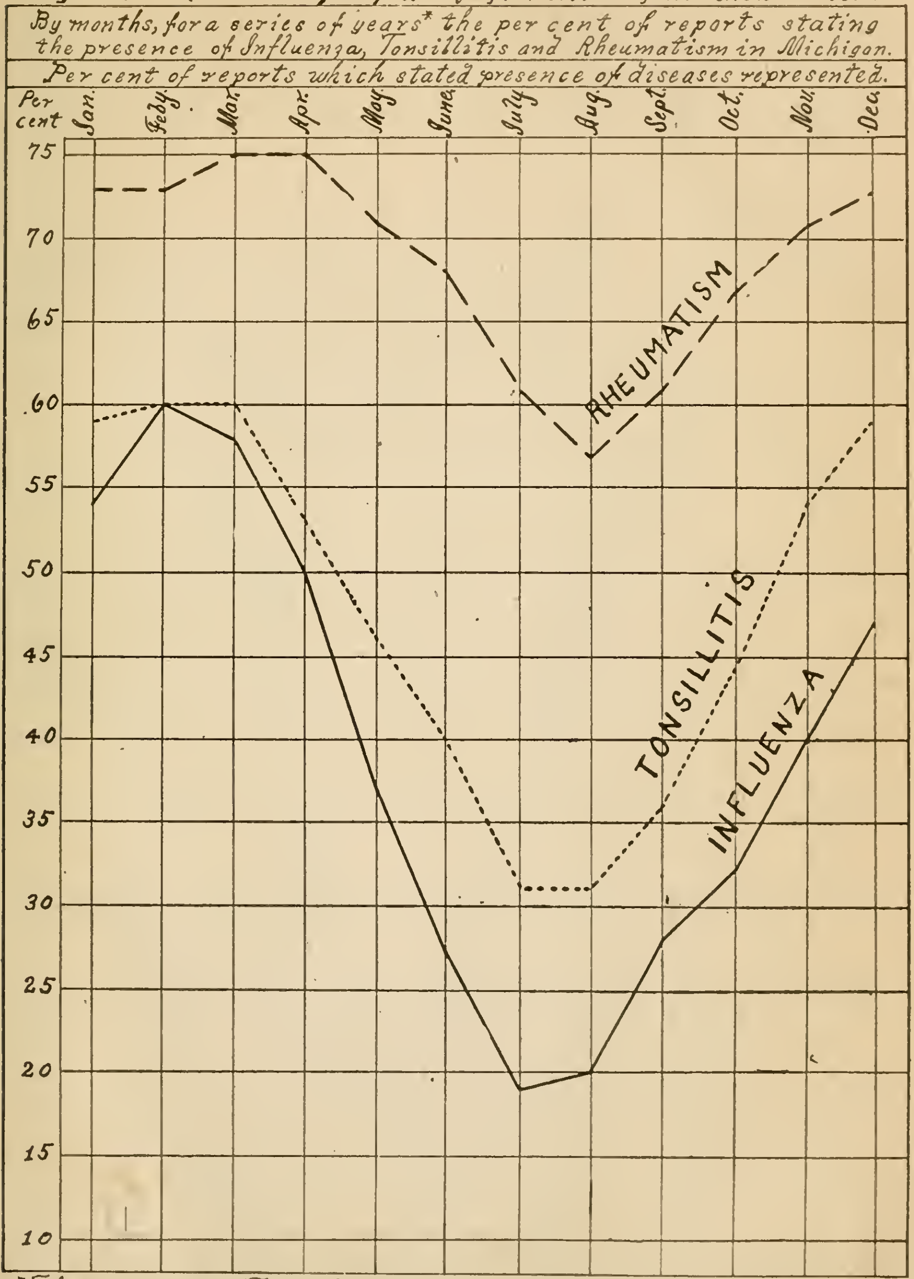
* The facts for each month in 1890 are graphically represented in Diagram 4, page clxvi.
† This is shown by weeks at the close of Table 1, further on in this paper.

EXHIBIT 2.—*Relations of Influenza, Tonsillitis, Rheumatism, Neuralgia, Bronchitis, Pneumonia, and Pleuritis, by months, for a series of years,* as indicated by the per cent of weekly reports stating their presence in Michigan. (These data relate to sickness, not deaths, and are graphically represented in Diagrams 1 and 2, which exhibit the relations of each disease to the others, and also the relations of each to seasons of the year.)*

| Diseases. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Influenza† | 54 | 60 | 58 | 50 | 37 | 27 | 19 | 20 | 28 | 32 | 40 | 47 |
| Tonsillitis † | 59 | 60 | 60 | 53 | 46 | 40 | 31 | 31 | 36 | 44 | 54 | 59 |
| Rheumatism † | 73 | 73 | 75 | 75 | 71 | 68 | 61 | 57 | 61 | 67 | 71 | 73 |
| Neuralgia ‡ | 69 | 71 | 73 | 72 | 67 | 64 | 60 | 58 | 59 | 63 | 68 | 69 |
| Bronchitis ‡ | 75 | 76 | 76 | 70 | 61 | 53 | 43 | 41 | 48 | 55 | 65 | 70 |
| Influenza‡ | 54 | 60 | 58 | 50 | 37 | 27 | 19 | 20 | 28 | 32 | 40 | 47 |
| Pneumonia ‡ | 56 | 61 | 60 | 52 | 39 | 24 | 15 | 13 | 16 | 21 | 32 | 43 |
| Pleuritis ‡ | 24 | 32 | 29 | 23 | 18 | 14 | 8 | 8 | 9 | 15 | 16 | 22 |

* The data for influenza, bronchitis, pneumonia, and rheumatism are the per cents of weekly reports for 12 years, 1877-88.
The data for tonsillitis and neuralgia are the per cents of weekly reports for 10 years, 1879-88.
The data for pleuritis are the per cents of weekly reports for the single year 1888.
† This line is graphically represented in Diagram 1.
‡ This line is graphically represented in Diagram 2.

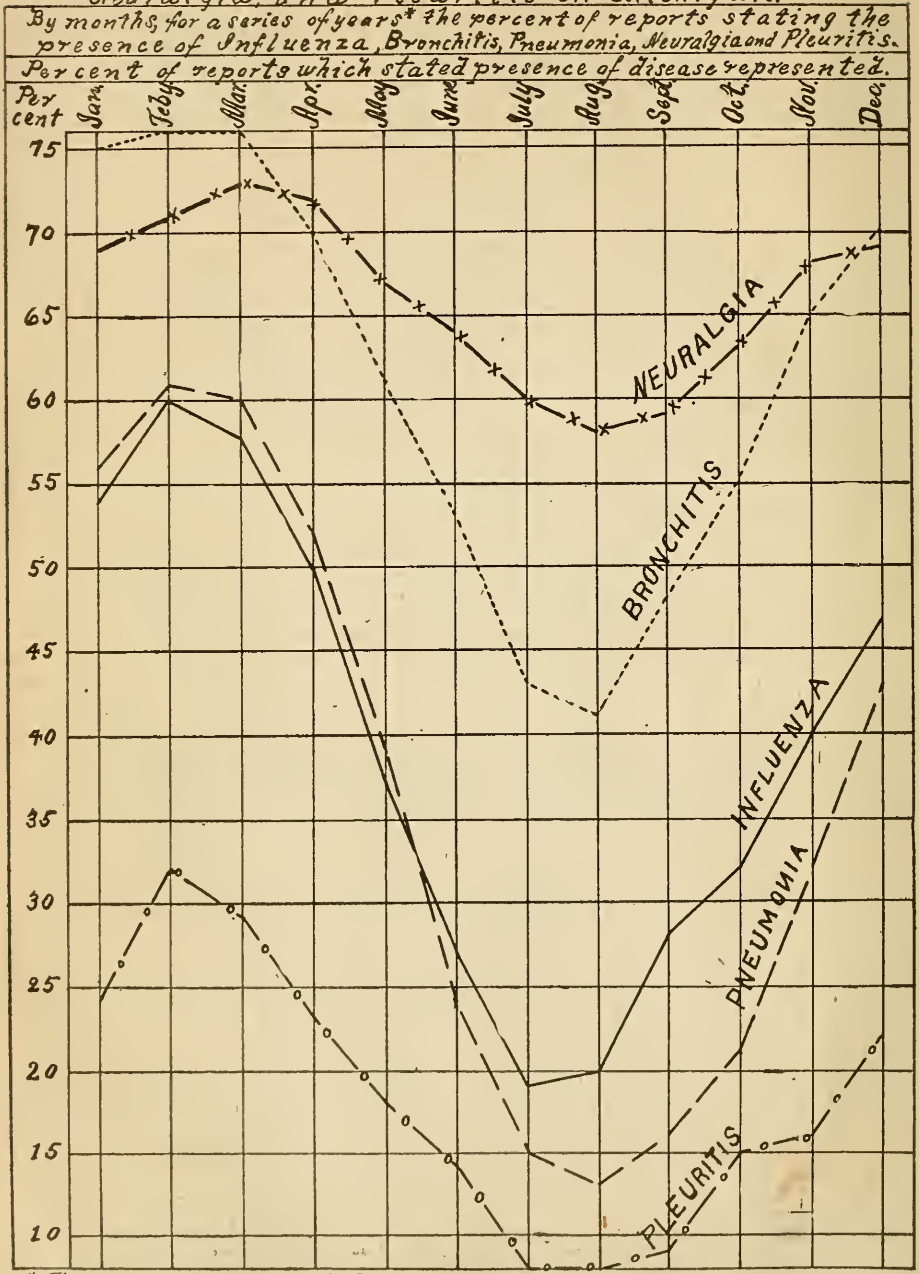
Diagram 1.- Relation of Influenza, Tonsillitis, and Rheumatism.



*The curve for Tonsillitis represents per cent of reports for 10 years 1879-'88. The curves for Influenza and Rheumatism represent per cent of reports for 12 years 1877-'88.

PLATE NO. 794.

Diagram 2.-Relation of Influenza Bronchitis, Pneumonia Neuralgia, and Pleuritis in Michigan.



By months, for a series of years* the percent of reports stating the presence of Influenza, Bronchitis, Pneumonia, Neuralgia and Pleuritis.

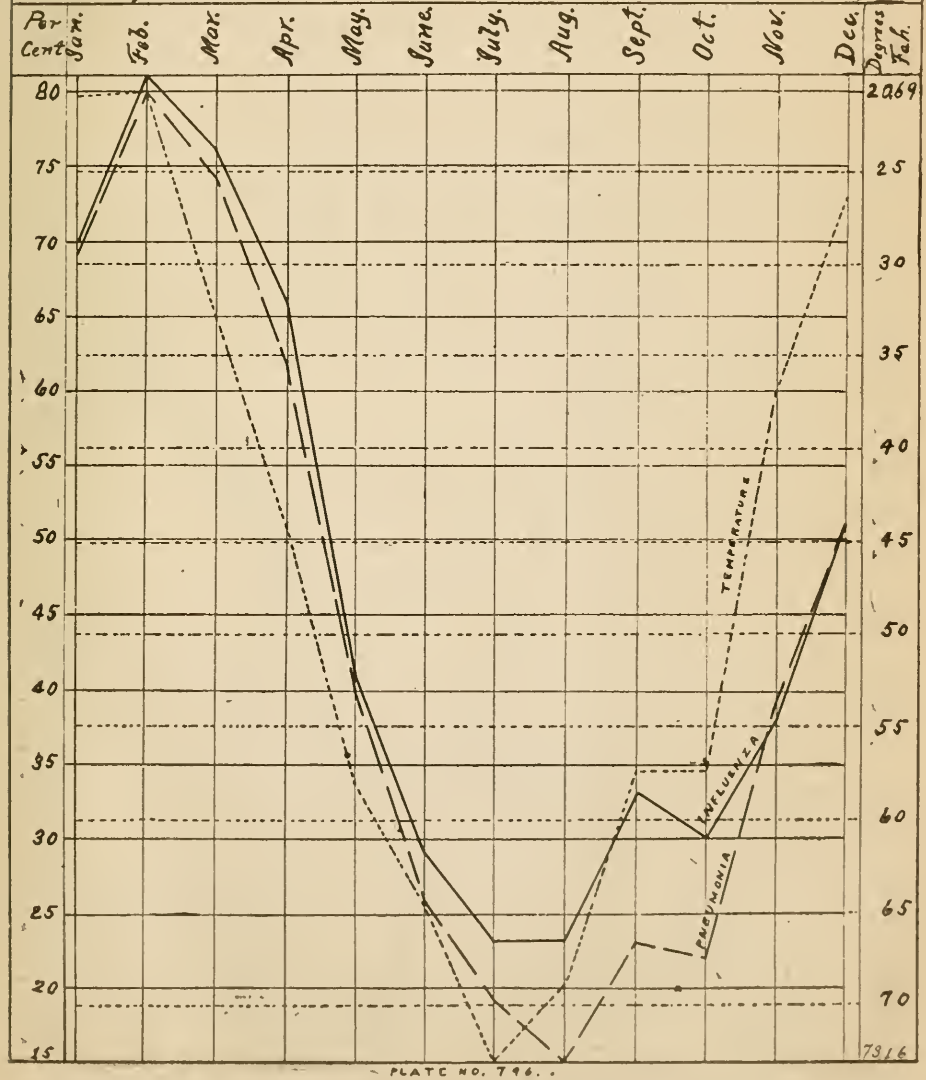
Percent of reports which stated presence of disease represented.

*The curve for Influenza, Bronchitis, and Pneumonia represents per cent of reports for 12 years, 1877-'88. The curve for Neuralgia represents per cent of reports for 10 years 1879-'88. The curve for Pleuritis represents per cent of reports for year.-1888.

PLATE No. 795.

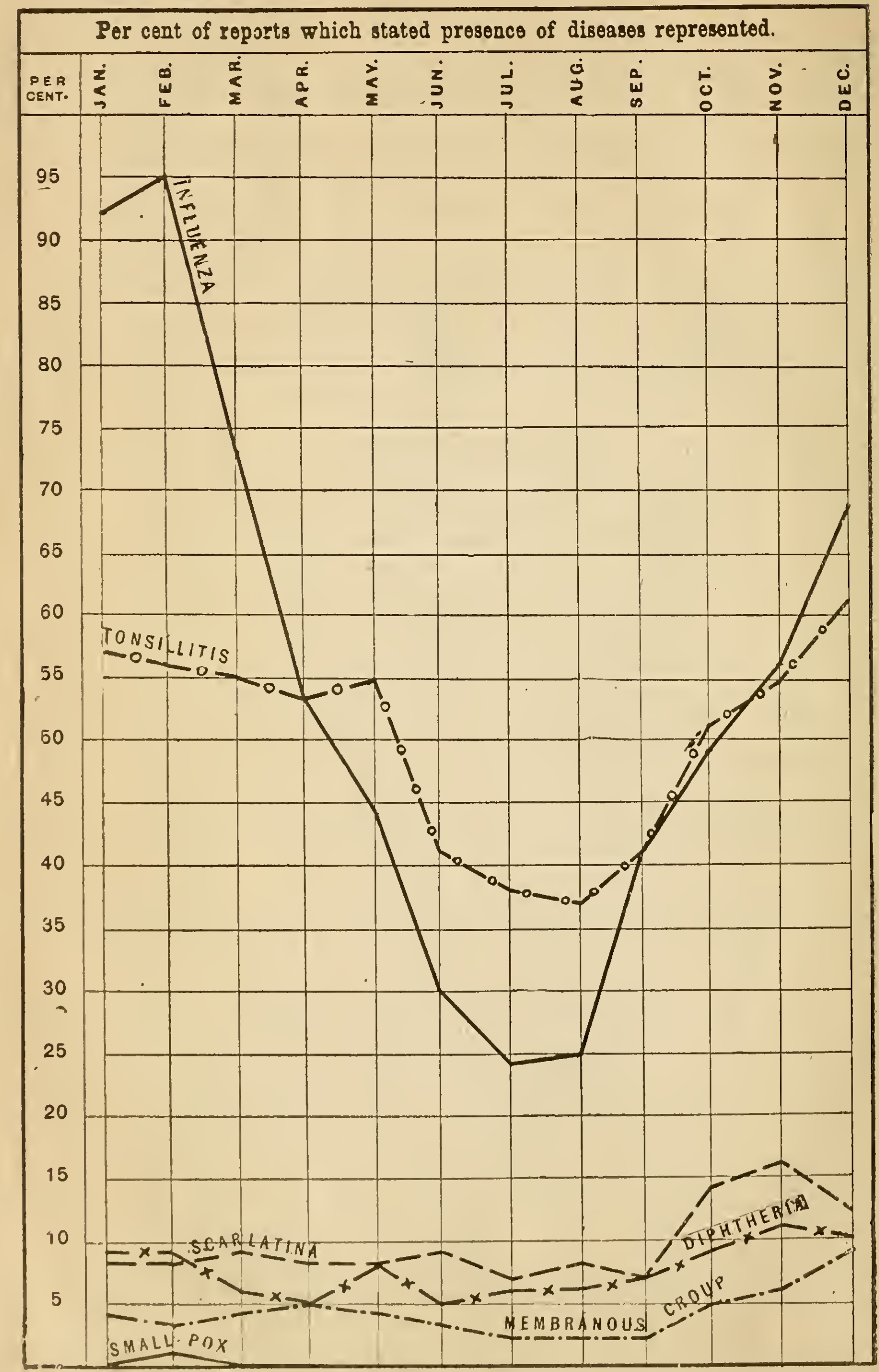
Diagram 3.- Relation of atmospheric Temperature to sickness from Influenza and Pneumonia in Michigan.

By months, for the epidemic year - 1879, the per cent of weekly reports which stated the presence of Influenza and Pneumonia: also the atmospheric temperature - average at 19 stations. (The temperature line is reversed - scale reads downwards)



Tabular statements for all the lines on this diagram are in Exhibit 3, page clxvii.

DIAGRAM 4.—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1890.



Comments on this Diagram are at bottom of page clxi. The tabular statement for the line representing influenza is in Exhibit 1, page clxii.

EXHIBIT 3.—*Atmospheric Temperature, and sickness from Influenza and Pneumonia in Michigan in the epidemic year 1879; exhibiting, by months, the average temperature, in degrees, Fah., at 19 stations, and the sickness by per cent of weekly reports which stated the presence of each disease.*

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature | 20.85 | 20.69 | 33.08 | 44.29 | 58.03 | 64.70 | 73.16 | 68.99 | 57.43 | 57.43 | 36.80 | 26.41 |
| Influenza | 70 | 81 | 76 | 66 | 41 | 29 | 23 | 23 | 33 | 30 | 38 | 51 |
| Pneumonia | 69 | 80 | 74 | 62 | 40 | 26 | 19 | 15 | 23 | 22 | 39 | 51 |

The three lines in this exhibit are graphically represented in Diagram 3, page clxv.

## *Influenza Precedes and is Accompanied by Many Diseases.*

In this epidemic of 1889-90, as in previous ones, it has been apparent that several very common diseases have contributed largely to the mortality. The recent epidemic has taught many that epidemic influenza is accompanied by, and precedes, several diseases, in a way to indicate a causal or at least a necessary relation.

It is stated frequently that epidemic influenza differs from ordinary influenza in being so closely associated with bronchitis, congestion of the lungs, pneumonia, heart failure, erysipelas, herpes, etc., it never having been generally accepted as established in medical science that ordinary *non-epidemic* influenza is thus associated. I say not "generally accepted" as established because I think that I have established and published the fact so far as relates to the most important of these diseases; and I think the reason why the members of the medical profession have not reached the same conclusion from their clinical experience is because in practice a physician may see many isolated cases of influenza when that disease is not epidemic, and may see some of those same patients afterwards sick with pneumonia, or erysipelas, and yet not have sufficient evidence to convince him that there was any necessary relation between the two circumstances; but in an epidemic it is possible for a practitioner to have in mind a great number of instances occurring at or near the same time, and from them to reach conclusions which could not safely be reached through the observation of even the same number of isolated cases widely separated in time and place and therefore liable to be under different conditions which could not be known or estimated.

But I think the fact should be generally recognized that when a statistician brings together and tabulates observations, made by physicians, of thousands of cases of a given disease, and does the same for thousands of cases of another disease, occurring in the same area, at the same time, and presumably under similar conditions, he is practically enabling us to see what relations those diseases sustain to each other. In several instances heretofore I have done this for influenza, when it was not epidemic and when it was epidemic, and the fact is that in such times in the year as influenza is *least* epidemic,—*least* prevalent, then, or immediately afterwards several other important diseases manifestly associated with epidemic influenza are *least* prevalent; and at such times in the year as influenza is *most* prevalent then or soon after, those other diseases are *most* prevalent; that the relation between influenza and these diseases is, approximately, quantitative.*

This is shown, more graphically I think than has ever been done heretofore, by Diagrams Nos. 1 and 2, which I have had prepared for this paper, and copies of which are distributed here. (They are printed on pages clxiii, clxiv.) They prove that, in Michigan, the relationship between influenza and several other diseases, as to times of greatest and of least prevalence, is very close. These diagrams relate to *sickness*, not deaths, and the data exhibited in them may be seen in Exhibit 2, page clxii.

(Diagrams 1 and 2, should be compared with Diagram 3, page clxv, which exhibits the close relationship of influenza to pneumonia in an *epidemic* year—1879. Diagram 3 includes also a line representing the coincident atmospheric temperature, the data for which may be seen in Exhibit 3, further on in this paper, under the sub-head "Influenza and Atmospheric Temperature." Comments on the comparison mentioned above, and on the teaching of Diagram 3, may be seen in a footnote on page clxi, in connection with the sub-head "Epidemic, substantially the same as non-epidemic influenza," under which are remarks bearing upon the branch of the subject here dealt with. And the subject is again taken up and continued further on in this paper, under the sub-head "The relationships of rheumatism, neuralgia, tonsillitis, influenza, and diseases of the lungs,—cold-weather diseases.")

### *Influenza and Cerebro-spinal Meningitis.*

In general, influenza is usually followed by nearly all the diseases of the air-passages, and by several communicable diseases that enter by way of the air-passages, including diphtheria, scarlet fever, small-pox, and consumption. This general statement which I can assure you is true, is illustrated by diagrams submitted herewith. (Not all published here.) But perhaps the most frequent noticeable epidemic disease to follow epidemic influenza is cerebro-spinal meningitis.

There is now opportunity to offer a possible explanation of the reason for this:—In cerebro-spinal meningitis it has been found that in the inflamed areas there is a micro-organism, which was first discovered by Dr. Sternberg in experiments with rabbits, but since then found to be present in pneumonia, and believed to be the cause of pneumonia,—Sternberg's "*Micrococcus Pasteuri.*" Fränkel, Weichselbaum and others, in a series of cases of primary cerebro-spinal meningitis, have obtained pure cultures of this same micro-organism, which now has many synonymous names, given it by many observers.† It is now recognized as present in the pus of meningitis.

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* Tonsillitis does not seem to be one of the diseases which is increased during an epidemic of influenza, although in other years its prevalence coincides markedly with that of influenza. This is shown by Diagrams 1 and 4.

† New York Medical Jour., March 17, 1888, p. 288.

### *Osteo-myelitis, Following Influenza.*

The evidence of surgeons, bacteriologists and others enables us to trace the results of influenza to diseases which would not ordinarily be suspected as having such a causation. One of the interesting facts of this nature is the apparent causation of osteo-myelitis (an inflammation of the bone and marrow). It seems to be proved that this disease is caused by the same micro-organisms that commonly cause the formation of pus.

The writer of the article on this subject in Wood's "Reference Hand Book of the Medical Sciences," says:—"Numerous accurate investigations of the pus obtained either directly from the medullary canal or from the depth of the tissues surrounding the bone, and subsequent pure cultivations, have settled this question definitely. Lücke and Recklinghausen have thus shown that numerous cocci and bacilli are invariably present. The most important of these seem to be the golden and the white *staphylococcus* the *S. pyogenes aureus* and *S. pyogenes albus*. * * *

"It has been found that if a pure culture of the staphylococci be injected into the blood of an animal which has first been subjected to fracture or contusion of a long bone, the animal dies in about two days; and on autopsy abscesses are found in the bones and around them, at the seat of injury, and also sometimes in the lungs and kidneys.

"How are we to explain the entrance of these germs without an apparent traumatism as a doorway? The only plausible assumption seems to be that they pass in through slight abrasions of the mucous surfaces of the body. Clinical facts support the theory that, preceding myelitis, patients will be found to have suffered from bronchitis, enteritis, etc. (Kocher)."[*]

If these particular pus-forming micro-organisms are capable of such mischief in the human body, and of causing the death of animals "in two days" as just quoted, and if as believed they do, enter the body through breaks in the lining of the air-passages, and cause osteo-myelitis whenever there is injury to a bone, what do they do when there is not injury to the bone? Drs. Prudden and Northrup say:—"We have been able to induce in rabbits, with the greatest uniformity, by the intratracheal injection of pure cultures of the streptoccocus isolated from the children's lungs a lobular and broncho-pneumonia very similar in its character to that with which we started in the children."[†] And, what is the probability of their gaining an entrance? In the nose, mouth, or air-passages of what proportion of persons is this micro-organism present waiting only for the person to "take cold"[‡] to be able to enter the general circulation of the blood in the body? This question we now have facts bearing upon.[§] Some of them may be quoted as follows:—

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[*] Wood's Reference Handbook of the Medical Sciences, Vol. V, pp. 382-3.

[†] American Journal Medical Sciences, Vol. 97, p. 578.

[‡] Some of the phenomena of "Taking cold" are suggested under that sub-heading, page clxxii.

[§] American Jour. Medical Sciences, Vol. xcviii. Sept., 1889, pp. 275-277. "The Micro-organisms of the Mouth; the Local and General Diseases Caused by Them." By W. D. Miller, M. D., Ph. D., Prof., University of Berlin, 8vo., pp. xx, 305. Leipsig, 1889. New York Medical Jour., Vol. L, July 27, 1889, pp. 92-93. See, also, the page following this.

## *Pathogenic Micro-organisms Contained in the Mouths of Healthy Individuals.*

[Translated for this Bureau* from *La Rivista Internazionale d'Igiene*, April, 1890.]

"Vignal has observed more than twenty species of micro-organisms in the mouths of healthy individuals. Netter has conducted experiments directed solely to the pathogenic micro-organisms existing in the mouth which may determine affections in other organs, These pathogenic agents are the pneumococcus, the streptococcus pyogenes, the capsule bacillus of Friedländer, and the staphylococcus pyogenes.

"The pneumococcus exists in the mouth of the healthy individual in at least 20 cases out of 100, the streptococcus in 5.5, the capsule bacillus in 4.5. These figures are propably lower than the actual proportion. Netter's results from saliva inoculations were sometimes positive, sometimes negative. The reason for this may be that the saliva did not contain pathogenic micro-organisms in sufficient quantity at a given moment of inoculation.

"The pneumococcus is the pathogenic agent of pneumonitis and also determines other affections. Netter has verified its presence in 14 cases out of 43 of broncho-pneumonia, in 19 cases out of 54 of purulent pleuritis, in 26 cases out of 62 of otitis media, in 16 cases out of 25 of suppurative meningitis, and in 14 cases out of 37 of ulcerous endocarditis.

"The streptococcus pyogenes is frequently found in visceral suppuration, in purulent arthritis and in pyæmia; its identity with the streptococcus of erysipelas has been verified. Netter has observed the streptococcus 20 times in 43 cases of broncho-pneumonitis, 27 times in 54 of purulent pneumonitis, 32 times in 62 of otitis media, 4 times in 25 of purulent meningitis, 12 times in 37 of ulcerous endocarditis, 6 times in 6 of acute cervical adenitis, 4 times in 4 of suppurative arthritis.

"The pneumo-bacillus of Friedländer is found in broncho-pneumonitis and otitis-media. Netter observed it in a case of ulcerous endocarditis, in one of purulent pleuritis, and one of cerebro-spinal meningitis.

"The mouth is indisputably the point of departure of pathogenic agents.

"The modus of the introduction of these agents is to be considered in connection with the position and function of the mouth. Once established in the bucco-pharyngeal cavity the germs find the soil favorable for their development, thanks to temperature and the alkaline reaction of the saliva. They may remain indefinitely in the mouth and morbid phenomena fail to appear. The preventing cause is the integrity of the membrane which lines the mouth, the pharynx and the cavity with which the pharynx is connected. Gamaleia has demonstrated that a culture of pneumococcus may be injected into the trachea of a ram without determining pneumonitis. The pneumococci are absorbed and digested by the cells of the trachea and the bronches. When these cells are destroyed the development of pneumonitis follows on inoculation.

"When the integrity of the membranous lining of the bucco-pharyngeal cavity is impaired in consequence of wounds, cold, or vaso-motor disturbances, the development of the disease due to the particular micro-organism ensues.

"Hence the frequency of some diseases and the gravity of others is diminished when the pathogenic micro-organisms of the mouth are destroyed, or when they remain innocuous."

## *Modes of Spreading and of Contracting Micro-organisms.*

But when these micro-organisms are not in the mouth or air-passages they may be where they may readily enter. For instance on the hands, and thus liable at any time to get into the mouth by some such act as moistening the finger to turn the leaf of a book or a package of bank bills. How generally they may be present on the hands is not known; but experiments at the hygienic laboratory of the U. S. Marine Hospital Service, New York, November, 1889, proved that of twenty-six observations of the hands of nurses in Surgical wards pus organisms were found in sixteen. This was after the hands had been cleansed and effort made to free them from such organisms.

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* "Abstract of Sanitary Reports," published by the U. S. Marine Hospital Bureau, Washington, D. C. May 9, 1890.

It seems probable that a single case of influenza, where the discharges from the nose are allowed to dry upon the handkerchief, must result in scattering these micro-organisms throughout every room in which such person has occasion to take out his handkerchief.

## *Bronchitis, Pneumonia and Other Complications of Influenza.*

The micro-organisms actually found in the recent epidemic are reported, by Dr. T. Mitchell Prudden, as follows:—

"The results of this series of studies may be summed up in a very few words. In two of the three cases of influenza associated with bronchitis there were very large numbers of *Streptococcus pyogenes;* this was the prevailing species. All the rest were scattering forms, commonly found in the sputum in bronchitis, most of them the ordinary aerial bacteria. In the other case of bronchitis there were large numbers of the Diplococcus pneumoniæ of Fraenkel and Weichselbaum, associated with a few Staphylococcus pyogenes aureus, and several scattering forms.

"In the secretion from the nose of one of the cases with coryza were a few of the Staphylococcus pyogenes aureus, while all the rest, which were not numerous, were scattering forms. While these cultures were being made the scanty sputum from a case of moderately severe simple pharyngitis was studied in the same way, and in this very large numbers of the Diplococcus pneumoniæ were isolated, together with a considerable number of scattering forms. * * *

"Let us turn now to the pneumonia which has been so frequent, and in many cases so serious, a complication of influenza in our recent epidemic. I have examined by the culture methods the sputum from five cases suffering from a prolonged and irregular pneumonia immediately following the influenza attack, all hospital cases; also the irregularly hepatized lung from a fatal case of pneumonia following influenza; six cases of pneumonia following influenza in all.

"The cultures of the sputum of the first five cases showed enormous numbers of the Diplococcus pneumoniæ in four. In all of these four cases there were also considerable numbers of Staphylococcus pyogenes aureus, together with moderate numbers of other scattering forms—and in one, large numbers of Streptococcus pyogenes. In the fifth sputum specimen there were very large numbers of Streptococcus pyogenes and Staphylococcus pyogenes aureus and a considerable number of scattering forms. From the lung of the fatal case enormous numbers of the Diplococcus pneumoniæ were cultivated, and nothing else. It was a pure culture.

"Thus in five out of six cases of prolonged and irregular pneumonia following influenza, the Diplococcus pneumoniæ was found, being identified in all five cases by culture and by animal inoculation. The only other pathogenic species found were the Streptococcus pyogenes, and the Staphylococcus pyogenes aureus. * * *

"It seems pretty well established that the Diplococcus pneumoniæ of Fraenkel and Weichselbaum is the most common, if not the exclusive, primary etiological factor in acute lobar pneumonia, judging from its constant occurrence in the affected regions, from its pathogenic effects upon animals in experimental inoculation, and from its frequent occurrence in complicating lesions.

"The very frequent occurrence of this micro-organism in the saliva of healthy persons not only does not militate against its etiological importance, but furnishes a most satisfactory rationale of the occurrence of the disease. For under ordinary conditions the Diplococcus pneumoniæ appears to be quite harmless in the saliva. It is only when the suitable predisposing conditions—which we recognize in injuries, and in exposure to cold and wet, but which in many cases we do not understand at all—are fulfilled, that the growth of the germ in the lungs and its accompanying lesions can occur." * * *

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"NOTE.—While this article was in press the results of a similar study on the influenza, by Rikert, in Bonn, reached this country in the Deutsche Medicinische Wochenschrift, of date of Jan. 23, 1890. His bacteriological study of five cases of influenza, two of which were without, the others with, pneumonia, showed that the only species constantly present was the Streptococcus pyogenes. The Diplococcus pneumoniæ he did not find at all. He very guardedly suggests the possibility that the Streptococcus, in association with some unknown peculiar atmospheric condition, may cause the disease. Whether this be true or not, he would lay stress upon the probable importance of the Streptococcus in inducing the various complications."—*T. Mitchell Prudden, M. D., in Medical Record, New York, Feb. 15, 1890, pages 169-170.*

### *Taking Cold. Taking Germs.*

"Taking cold" seems to be a complicated affair, one element of which is, sometimes, a drying up of the normal mucus in the nose—a "stopping up of the nose," as it is usually expressed.

*This removes the normal defense against the introduction of the specific causes of diseases*, the "germs" as they are called, which normally are not admitted in the nose beyond the lower one inch or less, being kept out by the moist hairs and moist mucus which flows just fast enough to wash the germs down to the entrance where normal evaporation leaves them.* The inhalation of dry air or of cold air (which because of its coldness has parted with all vapor of water) tends sometimes to abnormally dry out the nasal mucus and thus to permit all germs which may be floating in the air of infected places to enter the body with the air inhaled.

Another factor in taking cold is probably a paralyzing effect of the prolonged inhalation of cold air on the minute hair-like processes of cells lining the air-passages, called cilia, which in health are constantly in motion in such manner as to carry all dust and germs upward and outward from the air-passages. The mouth when open is not, as is the nose, guarded from the introduction of germs. In infected localities the mouth is liable to contain a few germs, as is proved by quotations in another part of this paper. Probably a function of the tonsils is to supply mucous corpuscles,—phagocytes, for the destruction of germs which gain entrance to the mouth, thus standing as guards at the entrance of the body. When, through the inhalation of air unusually irritating because too dry, cold, or containing too much ozone, the tonsils are irritated unduly, their function may be interfered with, the cilia may be paralyzed, and disease germs may then gain entrance to the bronchial tubes, resulting in bronchitis, or, if the germs reach the air cells, pneumonia may result. The germs may be streptococci, Friedländer's pneumococcus, Sternberg's *Micrococcus Pasteuri*, the acknowledged cause of croupous pneumonia, the Bacillus tuberculosis, the cause of consumption or some as yet undiscovered specific influenza germ. All or many of these germs may gain entrance, and "mixed infection" result. The nature of the disease which shall result from the "taking cold" depends, apparently, very much upon what species of germ, and how many of each species, gain entrance to the body, and to what parts of the body they gain entrance.

Other factors are so thoroughly dealt with further on in this paper that they need only be referred to here; they are the results of the evaporation of the fluids from the nose and air-passages. They are mentioned under the sub-head—"Influenza and the salts of the blood."

This explanation of some of the phenomena of "taking cold" should serve to give a clear idea of contracting influenza, which apparently, is the same as "taking cold." Probably the term might about as well be "taking germs." Several factors seem to contribute: First, the germs, then either a dusty, windy, cold or otherwise drying atmosphere which shall interfere with the mucus in the nose, or by evaporation cause the deposition of an irritating salt, or an irritating atmosphere which like ozone shall cause some break in the cells of the mucous membrane, or a paralyzing influence on the cilia, such as a cold atmosphere. When all these influences combine, to an unusual degree, epidemic influenza results. The evidence in the statistics of sickness and meteorology in Michigan seems to prove that this is true; also that any one of these influences may be extremely unusual *by itself*, and no very unusual amount of influenza occur.

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* "Physiologists state that at least a pint of serum is poured out by the venous sinuses of the nose each twenty-four hours."—*C. H. Stowell, M. D., Washington, D. C., in N. Y. Med. Jour., Mar. 1, 1890, p. 235.*

### *Time of Greatest Force of the Epidemic of 1889–90.*

As showing the force with which the recent epidemic struck various European cities, as evidenced by the mortality from all causes, also showing the week in which the greatest mortality occurred in each city, which may indicate the direction of the movement, I submit a table (1) exhibiting, by weeks about the time of the epidemic, the reported mortality rates in certain European cities, followed by the mortality statements for a few American cities, and the weekly sickness-rates in Michigan. The week in which the greatest mortality occurred is indicated by a line drawn underneath the figures representing the deaths per annum per each thousand inhabitants.

### *Direction of Movement of the Influenza. Possible Explanation.*

Table 1 shows the movement of the wave to have been, in general, westward and southward, from St. Petersburg where it began about the middle of October, the highest mortality there having been reached in the week ending November 30, 1889. This direction was nearly what should have resulted if the disease was carried by the "East wind" which for many years has been associated, in the minds of many persons, with the influenza. The general direction is precisely what it should have been if the wind were the same at other places as it was at St. Petersburg during a part of the onward progress of the epidemic, namely from the Northeast. (I regret that I have not found time to investigate many of the other places.) It may be briefly stated here that, in this paper, wind and ozone are proved to have causal relations to influenza. If the atmospheric ozone is, as alleged, due in great part to atmospheric electricity, and that, as we know, depends greatly upon influences reaching this earth from the sun, it is easy to see that the variations in the amount of ozone must follow the apparent course of the sun—from east to west, and, although the movement would encircle the entire earth in twenty-four hours, yet if an unusually great electrical disturbance on the sun continued, each succeeding day would bring to the earth unusual additional electricity, accordingly, there would be formed more ozone, which would be exceedingly increased locally by an east wind which instead of bringing air from the Westward where the ozone had been used continuously without replenishment because of direct solar radiation* for twenty-four hours, should bring along air in which ozone had just been formed in other parts of the world over which the sun has just passed, and where there had not yet been opportunity for the use and destruction of the ozone. The foregoing is suggested here for purposes of study in connection with the facts exhibited in Table 1, but the subjects of wind and ozone in relation to influenza are considered at length further on in this paper.

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* "It is my conviction that when sunlight falls upon any moist and oxidable body in the presence of free oxygen, ozone is formed."—*Prof. R. C. Kedzie, Annual Report of the Secretary of the Michigan State Board of Health for 1875, p. 138*, where experiments which led to that conviction, are described.

TABLE I.—*Mortality rates* in European cities.—Showing the force of the epidemic, and the time of greatest mortality†, indicating the direction of the movement.*

| Names of cities. | In the weeks ending. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1889. | | | | | 1890. | | | | |
| | Nov. 30. | Dec. 7. | Dec. 14. | Dec. 21. | Dec. 28. | Jan. 4. | Jan. 11. | Jan. 18. | Jan. 25. | Feb. 1. |
| St. Petersburg | 39.0 | 33.7 | 33.2 | 30.9 | 25.6 | 27.7 | 29.5 | 26.3 | 30.4 | 30.9 |
| Odessa | 22.0 | 26.4 | 37.1 | 29.1 | 28.3 | 27.5 | ------ | ------ | 23.5 | 22.8 |
| Warsaw | 34.9 | 36.4 | 42.7 | 44.0 | 36.9 | 35.8 | 30.3 | 26.1 | 27.6 | 26.1 |
| Stockholm | 17.1 | 18.2 | 31.7 | 41.2 | 41.0 | 27.3 | 20.9 | 20.5 | 18.0 | 19.1 |
| Danzig | 20.4 | 27.5 | 27.0 | 47.5 | 61.0 | 52.2 | 37.1 | 35.8 | 31.5 | 31.9 |
| Kiel | 25.9 | 21.7 | 33.5 | 42.5 | 69.6 | 36.1 | 39.6 | 29.9 | 32.5 | 34.3 |
| Berlin | 18.7 | 20.6 | 27.2 | 32.4 | 37.7 | 32.1 | 26.2 | 23.4 | 23.2 | 22.7 |
| Vienna | 23.2 | 23.6 | 26.5 | 29.7 | 45.9 | 42.8 | 34.4 | 26.1 | 27.4 | 22.8 |
| Cracow | 27.7 | ------ | 31.8 | 29.2 | 44.9 | 66.0 | 51.1 | 51.1 | 47.0 | 36.1 |
| Königsburg | 23.9 | 25.3 | 29.2 | 27.2 | 27.2 | 41.1 | 39.2 | 33.7 | 28.2 | 28.2 |
| Posen | 25.6 | 29.6 | 22.2 | 33.3 | 32.6 | 46.3 | 44.9 | 45.6 | 34.6 | 27.9 |
| Stettin | 27.1 | 32.2 | 30.2 | 34.6 | 35.1 | 46.8 | 42.4 | 30.7 | 27.3 | 18.0 |
| Hanover | 18.1 | 21.2 | 20.5 | 21.9 | 25.3 | 38.2 | 35.8 | 36.5 | 21.1 | 20.1 |
| Frankfort, Main | 15.1 | 22.1 | 16.8 | 19.6 | 27.4 | 41.4 | 39.0 | 24.7 | 18.6 | 18.3 |
| Paris | ‡ | 25.1 | 27.3 | 31.2 | 53.7 | 61.7 | 47.5 | 34.3 | 26.4 | 24.1 |
| Wurzburg | 19.8 | 17.1 | 28.8 | 25.2 | 32.3 | 60.3 | 55.8 | 26.6 | 30.1 | 31.0 |
| Dortmund | 19.1 | 25.7 | 19.7 | 26.9 | 42.5 | 55.9 | 47.7 | 33.8 | 28.5 | 21.0 |
| Bonn | ------ | ------ | ------ | ------ | ------ | 58.4 ? | 57.1 | 41.5 | 32.4 | ------ |
| Duisburg | 21.0 | 22.0 | 24.0 | 30.0 | 21.0 | 38.1 | 66.4 | 58.7 | 37.1 | 31.2 |
| Erfurt | 19.3 | 25.1 | 32.7 | 15.9 | 26.8 | 47.8 | 54.4 | 37.9 | 33.8 | 22.3 |
| Elberfeld | 22.7 | 17.1 | 21.0 | 18.4 | 24.9 | 39.4 | 60.3 | 50.5 | 27.4 | 20.1 |
| Wiesbaden | 16.7 | 20.2 | 26.4 | 20.2 | 23.7 | 28.5 | 56.1 | 58.5 | 26.8 | 30.2 |
| Darmstadt | 15.5 | 22.3 | 16.5 | 22.3 | 17.5 | 39.3 | 68.1 | 49.9 | 24.9 | 15.4 |
| Augsburg | 21.8 | 23.3 | 27.8 | 15.8 | 27.1 | 35.6 | 62.4 | 53.5 | 35.6 | 31.2 |
| Magdeburg | 20.4 | 22.5 | 25.2 | 27.2 | 27.8 | ------ | 53.4 ? | 43.0 | 28.0 | 22.0 |
| Buda Pesth | 29.7 | 27.7 | 29.0 | 30.6 | 32.9 | 36.0 | 51.4 | 48.1 | 40.0 | 33.3 |

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* The deaths during each week, if continued at the same rate for a year, would equal in each thousand inhabitants the number stated in this Table. For instance, in St. Petersburg in the week ending Nov. 30, the deaths were at the annual rate of 39.0 per thousand inhabitants.

† The time of greatest mortality is indicated by a line underneath the highest figures for the locality, the date of the ending of the week being shown at the top of the column.

‡ "The rate of mortality was only 20.2 per 1,000 during the week ending November 2nd, 1889, since which time it has steadily increased week by week until it reached 31.2 in the week ending December 21st, 53.7 in the last week of 1889, and further rose to 61.7 per 1,000 during the week ending January 4th. The average death-rate in the corresponding period of recent years was only 25.1 per 1,000; the death-rate during the week under notice was therefore considerably more than double the average."—*British Medical Journal*, Jan. 18, 1890, p. 146.

TABLE 1.—CONTINUED.—*Mortality rates in European cities, etc.*

| Names of cities. | In the weeks ending. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1889. | | | | | 1890. | | | | |
| | Nov. 30. | Dec. 7. | Dec. 14. | Dec. 21. | Dec. 28. | Jan. 4. | Jan. 11. | Jan. 18. | Jan. 25. | Feb. 1. |
| Brussels | 21.1 | 23.3 | 22.5 | 28.4 | 27.0 | 50.6 | 52 4 | 31.0 | 27.8 | 21.6 |
| Elbing | 29.1 | 28.6 | ...... | 22.2 | 36.4 | 60.8 | 61.6 | 44.9 | 34.7 | 27.0 |
| Dresden | 18.8 | 17.1 | 21.1 | 19.3 | 25.4 | 32.4 | 38.8 | 34.4 | 25.5 | 20.1 |
| Leipsig | 15.7 | 19.5 | 17.7 | 17.8 | 27.1 | 38.2 | 41.7 | 28.1 | 19.2 | 19.6 |
| Cologne | 18.9 | 24.7 | 23.7 | 24.5 | 29.5 | 51.0 | 52.2 | 36.6 | 25.5 | 19.5 |
| Hamburg | 19.7 | 20.6 | 25.1 | 26.7 | 26.9 | 31.6 | 32.1 | 28.1 | 30.6 | 31.6 |
| Munich | 23.8 | 22.5 | 28.8 | 26.5 | 28.8 | 43.0 | 48.6 | 44.8 | 32.7 | 29.3 |
| Stuttgart | 16.8 | 21.8 | 17.9 | 15.7 | 16.1 | 28.4 | 49.0 | 38.7 | 28.0 | 19.4 |
| Prague | 29.4 | 25.6 | 28.4 | 26.3 | 25.6 | 39.0 | 57.6 | 50.9 | 35.4 | 30.4 |
| London | 17.4 | 20.2 | *21.2 | 21.8 | 20.8 | 28.0 | 32.4 | 32.1 | 26.3 | 21.3 |
| Breslau | 23.1 | 24.5 | 27.9 | 24.1 | 24.8 | 28.4 | 26.8 | 33.0 | 30.5 | 28.2 |
| Brünn | 26.1 | 31.0 | 29.4 | 37.7 | 37.1 | 34.9 | 64.9 | 78.2 | 41.0 | 33.8 |
| Lemberg | 27.0 | 31.7 | 24.5 | 35.9 | 22.0 | 24.1 | 43.1 | 47.3 | 34.6 | 29.6 |
| Gladbach | 26.5 | 25.4 | 26.5 | 36.0 | 28.6 | 38.9 | 64.9 | 65.9 | 52.5 | 23.7 |
| Mühlhausen | 18.2 | 16.8 | 25.2 | 30.2 | 24.5 | ..... | 45.5 | 72.4 | 48.4 | 29.7 |
| Metz | 16.1 | 17.1 | 13.3 | 25.6 | 31.3 | ...... | ...... | 46.4<br>? | 44.5 | 33.1 |
| Münster | 31.2 | 25.6 | 29.0 | 22.3 | 29.0 | 39.5 | 40.6 | 65.8 | 42.8 | 25.2 |
| Rostock | 16.5 | 21.5 | 30.4 | 27.9 | 29.1 | 23.8 | 37.5 | 61.3 | 37.5 | 22.5 |
| Aachen | 33.8 | 29.8 | 33.8 | 31.3 | 30.3 | 35.6 | 55.4 | 58.4 | 34.2 | 31.2 |
| Trieste | 25.3 | 26.0 | 31.6 | 30.3 | 31.3 | 41.9 | 50.3 | 51.3 | 47.8 | 39.7 |

* Pall Mall Gazette, London, Dec. 9, 1889, reports two cases influenza, recently occurred at Bedford Park.

† The time of greatest mortality is indicated by a line underneath the highest figures for the locality, the date of the ending of the week being shown at the top of the column.

TABLE 1—CONTINUED.—*Mortality rates in American Cities.*

| Names of Cities and States. | 1889. Nov. | 1889. December. | | | | 1890. January. | | | | Feb. |
|---|---|---|---|---|---|---|---|---|---|---|
| | 30. | 7. | 14. | 21. | 28. | 4. | 11. | 18. | 25. | 1. |
| Boston, Mass. | 20.11 | 19.23 | 19.13 | 24.26 | 29.16 | 43.28 | 51.75 | ...... | 26 62 | 23.88 |
| Lowell, Mass. | 16.72 | 28.35 | 30.53 | 23.26 | 30.53 | 24.09 | 33.98 | ...... | 46.02 | 36.11 |
| Springfield, Mass. | 7.66 | 17.80 | 16.59 | 3.83 | 20.42 | 32.55 | 20.03 | ...... | 38.81 | 31.30 |
| 18–21 cities in Mass. | 17.20 | 19.01 | 17.50 | 20.11 | 23.74 | 30.29 | 36.95 | 35.78 | 28.29 | 22.23 |
| Lawrence, Mass. | 31.87 | 17.91 | 24.30 | 28.14 | 26.86 | 28.75 | 40.32 | ...... | 58.24 | 41.78 |
| Buffalo, N. Y. | 17.41 | 16.50 | 15.16 | 18.28 | 18.28 | 18.60 | 21.60 | 20.20 | 17.40 | 16.20 |
| Baltimore, Md. | 15.80 | 18.92 | 16.43 | 16.85 | 19.96 | 17.26 | 21.94 | 29.74 | 27.76 | 22.02 |
| New York City | ...... | 21.59 | 20.89 | 21.70 | 24.85 | 39 31 | 46.54 | 37.59 | 28.46 | 25.52 |
| Brooklyn, N. Y. | 18.06 | 19.17 | 20.29 | 20.60 | 22.27 | 28.83 | 38.19 | 35.86 | 26.44 | 22.65 |
| Cleveland, Ohio | 15.27 | 15.91 | 21.45 | 19.93 | 15 16 | 21.88 | 29.25 | 32.71 | 28.53 | 28.53 |
| Chicago, Ill. | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | † | ...... |
| State of Michigan, *Sickness** | * 38 | 44 | 33 | 36 | 38 | 77 | 82 | 95 | 98 | 98 |

* Per cent of observers whose weekly reports stated the disease under observation.

† A record of the death-rate of the city of Chicago by weeks, during the years 1889-90, was not published, but in the report of the Department of Health for the year 1890, pages 5-6, it is stated of the epidemic that "It reached its height in our city the last week of January, at which time my belief is that over one hundred thousand of our citizens were sufferers from that cause alone." * * * * * "It continued to prevail during February, March and April, but in a modified degree. I do not believe that any fresh cases occurred after the first of May. Its duration was about four months. The deaths *directly* attributed to it by the attending physicians, as shown by the certificates, were *one hundred and twelve*."

The population of Chicago at this time was 1,200,000, and the death-rate for the entire year 1890 was 18.22, a slight increase over the previous year.

During the month of January, 1890, the deaths in Chicago from consumption, pneumonia and bronchitis were very much greater than in any January in the years 1851–1889, and it may be added for any subsequent years up to and including January, 1894, as shown by the published records of the Health Department of the city. The deaths from consumption and bronchitis were nearly double that of any January in the years preceding 1890, and the deaths from pneumonia over three times as great, a striking illustration of the statement made on page clxvii, with respect to the relation of these and other cold-weather diseases to the prevalence of influenza.

## *Meteorological Conditions, and Influenza.*

In 1852, the Sydenham Society, in London, published the "Annals of Influenza * * * in Great Britain from 1510 to 1837, prepared and edited by Theophilus Thompson, M. D., F. R. S., etc."

These Annals review about twenty epidemics or "visitations" as they were called. These are described by several authors, but the series of articles is edited, and a summary is prepared, and I abstract, mostly from the summary, (pages 367-372) what I consider to be the principal facts as to the meteorological conditions which were believed to have relation to the Influenza,* naming first the year of the epidemic, then its alleged course, and a brief reference to the observed and recorded meteorological conditions, as follows:—

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* Meteors, earthquakes and many other conditions are named, but it is proper to exclude them here, this being an attempt to learn whether or not such causes as cold, wind, etc., which have long been generally believed to sustain a causal relation, were actually present in each epidemic. Cold is, I believe, a "*true cause*" if "present and acting." To what extent it was "present and acting" may be inferred from the brief references which I have here collected. Some investigators and compilers seem to ignore those facts which are so common as to be in the possession of the common people; they seek for some occult cause. It does not, therefore, lessen the value of the evidence of this table that the compiler of the "Annals of Influenza," from which the data in this table are taken, did not himself seem to recognize the full force of the evidence he presented relative to the influence of cold, especially when suddenly following heat, in the causation of influenza.

TABLE 2.—*Influenza—Years of Epidemics, Course, Season of Year, Meteorological Conditions, Associated Diseases, etc.*

| Epidemic year. | Course. | Season of Year, Meteorological Conditions, etc. |
|---|---|---|
| 1510 | North-westerly | Preceded by long-continued moisture; followed by remarkable storms. (See book.) |
| 1557 | Westerly | "The disease commenced in October, after a month of unusally cold winds." |
| 1580 | Toward west and north | "It commenced in October, after a cold dry wind" "Measles and small-pox speedily followed." |
| 1658 | | "In April, in the midst of a winterly spring." "North wind continually blowing." * * * "The north wind sometimes lessening, there would be a day or two very hot between." "No one living could remember such a year, for either excess both of heat and cold." "In the summer, a new fever affecting the 'brain and nervous stock.'" |
| 1675 | | "*In Autumn*, after pungent fogs, and [sudden] (p. 17) cold moist weather, following a hot Summer." (For Sydenham's view of causation, see pp. 18–19, Annals.) "Small-pox shortly followed." (p. 369.) |
| 1693 | | In November, after moderately warm weather, upon snow falling, suddenly it grew extremely cold, succeeded by a few days of very hard frosts, whereupon the epidemic seized great numbers of all sorts of people. (p. 23.) |
| 1710 | | "*In the Spring* * * * preceded by a long-continued, intense frost." (p. 369.) |
| 1729 | | "After a rainy November with high tides." (p. 369.) "The S. and S. W. winds blowing extremely hard." (p. 30.) "In December the coughs, fever, and small-pox continued epidemic, and maniacal disorders more frequent than usual." (p. 31.) |
| 1732–3 | Southerly | "In England, during a damp chilly spring." (p. 369.) February and March. (p. 32–3.) At Edinburgh in November and December, and among horses in October. |
| 1732–3 | Westerly, from Germany. | Following "a great drought." Fogs. (p. 36.) "In February, rheumatic and pleuritic fevers succeeded to the colds." (p. 43.) |
| 1737–8 | | The disease commenced in November. "Though the N. E. and N. W. winds kept the barometer up through the first part of the month, yet did they not in the least dry the air." (p. 53.) "The chief cause appears to me to lie in the thick, damp, chilly disposition." (p. 54.) |
| | | "In February, 1738, coughs and anginas were very common amongst horses." * * "Many persons dwindled away in a pulmonary consumption, occasioned by the catarrhal fever improperly treated, which was rife in * * Nov. and December." (p. 57.) |
| 1743 | | "Occurred in the Spring." "Great atmospheric vicissitudes. In 1743, very severe easterly winds for months before the visitation." |

TABLE 2.—CONCLUDED.—*Influenza, Epidemic Years, Course, Season, etc.*

| Epidemic year. | Course. | Season of Year, Meteorological Conditions, etc. |
|---|---|---|
| 1758 | Irregular | "Commenced in September, during easterly winds." "An unusual prevalence of easterly winds, but sky clear." (p. 370.) |
| 1762 | | "Commenced in September, after severe and variable weather." "Uncommon vicissitudes of heat and cold." (p. 370.) |
| 1767 | | "Raged in June and July, after cold weather." |
| 1775 | Westerly | "Prevailed during a wet Autumn." "Sudden changes of temperature. Thick noisome fogs." "This epidemic was followed by diarrhea." |
| 1782† | Westward from sea between Malacca and Canton, through Russia, Denmark and Holland | "Perhaps the most widely diffused of all recorded visitations." In England in May. Winter of 1781 changeable. "Spring of 1782 remarkably late, then gloomy, cold, humid, with occasional dry fogs, and peculiar storms." (p. 371.) |
| 1803 | Northward | "Preceded by epidemic diarrhea." "North-east winds, fetid acrid fogs, Aurora-Borealis, sudden atmospheric changes. Excessive mortality among insects, and disease of domestic animals." |
| 1831 | From China, in a year | "In June, after great vicissitudes of weather." |
| 1833 | | "In April, after damp weather, succeeding to cold." |
| 1836 | Perhaps endemic? | In January, after great depression of temperature, N. E. wind, frosty, foggy weather. (p. 332.) |
| 1837 | ? | "Reached London in January, after great humidity, and considerable atmospheric vicissitudes. Those most exposed to the weather most severely attacked." (p. 372.) |
| | | "Great depression of temperature between the 22nd and 25th of December—a fall of 25° F. in three days. This depression was caused or accompanied by a change of wind from west or north-north-west to north-north-east. On the 25th the wind blew a gale from the latter point, and during the three subsequent days a very unusual quantity of snow fell, unequaled in this country for duration, severity and extent." * * "On the 2nd day of January, the Influenza appeared in London * * and it was general throughout the country on the 7th, or at farthest on the 10th." (pp. 331-2.) |
| 1879. Michigan. | | Influenza was epidemic in Michigan in the spring of 1879, eighty-one per cent of all weekly reports of sickness during the month of February having stated that influenza was present. The atmospheric temperature was lower than usual in January and February.* |
| 1889. In St. Petersburg. | Westward and southerly | Remarks below. |
| 1890. Michigan. | | |

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*Table ("Exhibit 12") on a subsequent page will show the facts. Diagram 3, also.

†The remarkable meteorological conditions in St. Petersburg in this epidemic are mentioned further on, under the sub-head "Atmospheric Humidity and Influenza."

I believe that the epidemic rise of influenza in St. Petersburg became especially noticeable in the last two weeks of October, athough cases have since been remembered which occurred before that time.* I am indebted to the Chief Signal Officer of the United States for interesting meteorological data which have aided me in my study of this subject. The prevailing wind in St. Petersburg in October is West and South.† In October, 1889, the prevailing wind was *East* and South; and from the 17th to the 25th of October the wind was East or Easterly *at every tri-daily observation* and at every mid day observation except one it was also *northerly.* By studying the map of that country, I find that it must make a great difference in the atmosphere at St. Petersburg whether the wind for several days brings air from the usual Southwesterly direction, from Germany, Austria, and Italy, or as it did about the time of the epidemic rise of influenza in 1889, from northern Siberia and the Arctic ocean. The wind was not especially strong except on October 8, and 23 when it was fifteen, on October 10 when it was sixteen, and October 22 when it was eighteen miles an hour. This wind on October 22 and 23 rapidly lowered the atmospheric temperature, and very remarkably lowered the humidity. This had been preceded by unusually warm weather, the entire month of October, 1889 averaging 44.4°; while the average October temperature there is 40.1°.

About the time of the epidemic rise of influenza in St. Petersburg, then, a warm moist atmosphere was succeeded by a cold dry wind, sweeping down from northern Siberia and the Arctic ocean, and continuing for over a week. Can anyone imagine conditions more favorable for the increase of influenza?

The meteorological conditions described as having occurred at St. Petersburg about the 17th to the 25th of October, 1889, viz., cold, dry wind sweeping down from Northern Siberia and from the Arctic Ocean, were sufficiently antecedent to the time of the greatest mortality in that city, which reached its highest point in the week ending November 30, to be entitled to be considered as having a causal relation to the epidemic.

The attention of the whole civilized world has been attracted to St. Petersburg, Russia, as the source of this epidemic of influenza. Accordingly, it seemed to be important to ascertain the meteorological conditions there. The result is what might have been expected by a close student of epidemiology.

To the writer, however, it seems probable that St. Petersburg has been accepted as the source of the influenza in this epidemic, and in some of the preceding epidemics, simply for the reason that the eastern places suffered slightly earlier than places to the westward, and as St. Petersburg is about the eastern limit of civilization there was no communication from any place east of it. So far as relates to mortality statistics, this seems to be the truth; but it is stated that: "The epidemic was first noticed in Tomsk an important commercial town of Central Siberia—separated by nearly 2,000 miles from St. Petersburg—about October 15th, that is to say, at the very time when the epidemic was beginning to develop with rapidity in St. Petersburg."‡

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*British Med. Jour., Jan. 4, 1890, says: "The first cases recognized in Europe were observed in St. Petersburg about October 15, and by November 12 it seems to have spread over nearly the whole of European Russia."

†Av. velocity, in kilometers, = N. 97.3; E. 103.2; S. 206.6; W. 213.5.

‡British Medical Journal, Jan. 4, 1890, page 40.

Table 1, of this article, demonstrates that the epidemic caused most deaths in some places in precisely the same week as it did in other places thousands of miles to the westward; as, for instance, in London and in cities in Massachusetts in the week ending January 11. It is possible however, and, from the data, it seems probable, that if the deaths were compiled by days instead of by weeks, a movement westward and southward would be apparent. In some of the preceding epidemics it has been recorded that the rate of movement was about that of travel by means of horses. That would be at about the same rate as the average velocity of the wind near the earth's surface. It is worthy of remark, in connection with the occurrence of the epidemic at Tomsk, nearly 2,000 miles east and south from St. Petersburg, about October 15, 1889, that my Table 4 shows that during the first eight days in October the wind at St. Petersburg was from the direction of Tomsk,—"East and South." From the table supplied by the U. S. Signal Service, it appears that the average velocity of the wind on those days was eleven and one-quarter miles per hour. And the wind may have been from that same direction previous to October 1; and it is a fact that at a higher elevation than anemometers are usually placed the movement of the air in winds is at a much greater velocity*, so that during the first eight days in October there was probably opportunity for the germs of influenza to pass from Tomsk to St. Petersburg, if such germs can reach and be carried by the higher currents of the atmosphere, and continue to remain virulent. Similar remarks might, probably, apply to other cities and countries. But, if the view of the writer of this paper is correct, it is not necessary to assume that the germs were carried, by the wind or in any manner, except to localities where the meteorological conditions were not such as to favor the occurrence of the epidemic, because there are no places of considerable size that are free from the germs of the disease. In such places as were free from them the disease probably did not occur except the germs were brought by visitors or by the winds. In all large cities, however, all that is required is that the atmospheric conditions shall be those which for centuries have been recognized as causal, by careful observers. The Italians were correct when they named this disease "Influenza" implying that it was the result of the surrounding *influences*. Hippocrates was right when, in his work on Airs, Waters and Places, he set forth the fact that cold and damp weather produces diseases of the respiratory organs.† But in order to place the subject on a scientific basis, numerous facts must be placed upon record. The writer regrets that he has not investigated and recorded in this paper the meteorological conditions at each of the large cities at the time of and just preceding the epidemic of 1889-90. That work remains to be done, for this epidemic and for succeeding ones, in order to convince the skeptical.

(Copy.)

No. 7 D. Rec., 1890. Subject:—Wind at St. Petersburg, Russia.

SIGNAL OFFICE, WAR DEPARTMENT,
*Washington City, January 16, 1890.*

*Dr. H. B. Baker, Secretary State Board of Health, Lansing, Michigan:*

SIR:—Replying to your request of the 31 instant for the normal and the average wind velocity at St. Petersburg, Russia, for a few months past, I beg to enclose, herewith, a table of 15-year normal hourly and daily wind velocities for October and November, expressed in kilometers per hour. Also a table showing for October and November, 1889, the daily temperature, percentage of relative humidity, wind direction and force at St. Petersburg.

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* Experiments at Lansing, Mich., indicate that whereas above and near the top of a three-story building the wind averaged for a single year five (5.1) miles an hour, above the roof of the State Capitol (four stories high) the wind averages nearly twice as much, namely 9.8 miles per hour.

† The influences of dryness, wind, ozone and dust have generally been overlooked.

The force of the wind by self-registering anemometer is not published in the Bulletins of the Physical Central Observatory, from which the last named table was compiled, and I am therefore unable to give it to you except as expressed by the Beaufort scale. The normal wind direction at St. Petersburg for October and November is S. S. W.

Very respectfully,
(W. A. G.)
A. W. Greely,
*Chief Signal Officer.*

3 enclosures.

TABLE 3.—*Average velocity of the wind at St. Petersburg, Russia, from the N., E., S. and W. for each hour of the day, expressed in kilometers per hour for each month.**

| Hour of the day. | October. | | | | November. | | | |
|---|---|---|---|---|---|---|---|---|
| | N. | E. | S. | W. | N. | E. | S. | W. |
| 1 a. m. | 97.6 | 94.5 | 206.6 | 178.9 | 97.6 | 105.2 | 246.8 | 212.3 |
| 2 a. m. | 97.5 | 97.6 | 201.1 | 180.5 | 93.4 | 105.3 | 252.3 | 210.6 |
| 3 a. m. | 94.4 | 97.1 | 194.4 | 180.8 | 96.3 | 104.2 | 252.4 | 207.2 |
| 4 a. m. | 94.2 | 95.4 | 200.1 | 176.2 | 96.2 | 106 7 | 251.1 | 209.3 |
| 5 a. m. | 98.4 | 98.9 | 199.1 | 176.7 | 106.2 | 107.1 | 248.9 | 205.8 |
| 6 a. m. | 98.1 | 99.5 | 205.2 | 171.9 | 100.0 | 110.4 | 256.5 | 200.0 |
| 7 a. m. | 98.3 | 101.7 | 206.3 | 181.5 | 104.5 | 115.3 | 253.6 | 196.8 |
| 8 a. m. | 98.4 | 105.2 | 208.1 | 187.7 | 104.0 | 119.9 | 254.8 | 199.8 |
| 9 a. m. | 100.5 | 104.5 | 215.3 | 198.9 | 104.7 | 123.2 | 259.2 | 193.9 |
| 10 a. m. | 101.0 | 104.4 | 221.0 | 214.0 | 101.0 | 121.8 | 260.0 | 202.0 |
| 11 a. m. | 102.4 | 104.5 | 233.4 | 236.7 | 101.3 | 120.0 | 263.8 | 209.6 |
| 12 noon | 104.8 | 103.7 | 229.7 | 256.7 | 102.8 | 115.9 | 266.7 | 216.1 |
| 1 p. m. | 97.6 | 102 8 | 229.2 | 274.5 | 98.2 | 112.2 | 260.2 | 223.1 |
| 2 p. m. | 103.3 | 102 6 | 213.9 | 279.5 | 98.5 | 116.6 | 263.6 | 230.2 |
| 3 p. m. | 104.7 | 99.7 | 208.3 | 272.4 | 99.7 | 113.0 | 252.0 | 223.9 |
| 4 p. m. | 98.6 | 106.8 | 201.9 | 255.2 | 99.3 | 115.1 | 256.9 | 213.8 |
| 5 p. m. | 98.4 | 108.2 | 186.8 | 255.2 | 98.7 | 116.3 | 257.4 | 214.9 |
| 6 p. m. | 92.8 | 111.0 | 182.9 | 238.7 | 104.8 | 116.5 | 258.3 | 217.7 |
| 7 p. m. | 90.0 | 110.8 | 184.2 | 210.1 | 106.8 | 110.7 | 256.7 | 209.0 |
| 8 p. m. | 90.5 | 105.9 | 195.3 | 192.0 | 105.9 | 105.6 | 252.6 | 210.7 |
| 9 p. m. | 89.1 | 107.8 | 203.3 | 189.2 | 108.6 | 102.7 | 255.3 | 206.5 |
| 10 p. m. | 92.9 | 103.7 | 211.0 | 186.9 | 110.7 | 106.9 | 256.5 | 205.8 |
| 11 p. m. | 96.8 | 105.6 | 209.9 | 182.2 | 102.8 | 99.4 | 254.0 | 203.6 |
| 12 p. m. | 93.9 | 105.7 | 210 4 | 184.9 | 104.1 | 102.0 | 245.9 | 207.6 |
| Means | 97.3 | 103.2 | 206.6 | 213.5 | 101.9 | 111.3 | 255.6 | 209.6 |

U. S. Signal Office, Washington, D. C., Jan. 16, 1890.

* "Fifteen-year normal hourly and daily wind velocities for October and November, expressed in kilometers per hour."—*Letter from Gen. A. W. Greely.*

TABLE 4.—*Atmospheric temperature, and Direction and Velocity of the Wind, by tri-daily observations at St. Petersburg, Russia, October and November, 1889.* *

| Day. | October. | | | | November. | | | |
|---|---|---|---|---|---|---|---|---|
| | Prevailing direction of wind. | | Av. Temp. | Av. velocity of wind ‡ | Prevailing direction of wind. | | Av. Temp. | Av. velocity of wind.‡ |
| 1 | Southeasterly † | East and south. | 52.3* | 13† | Easterly & northerly | East and north. | 35.8 | 11 |
| 2 | Easterly† | | 61.8* | 8† | Southeasterly | South and east. | 28.9 | 13 |
| 3 | Southeasterly † | | 59.6* | 13† | do | | 33.6 | 13 |
| 4 | do † | | 56.1* | 16† | Southerly | | 35.7 | 8 |
| 5 | Easterly | | 54.5 | 11 | Southeasterly | | 35.8 | 3 |
| 6 | Southeasterly | | 52.4 | 8 | Southerly | | 38.4 | 11 |
| 7 | do | | 56.2 | 8 | Southerly & easterly | | 40.5 | 10 |
| 8 | Easterly | | 53.5 | 15 | Southerly | | 38.4 | 5 |
| 9 | Westerly | South-west. | 51.4 | 8 | East-northeasterly | East-northeast. | 37.2 | 8 |
| 10 | Southerly | | 53.8 | 16 | North-northwesterly | North and west. | 33.4 | 10 |
| 11 | do | | 57.4 | 18 | do | | 33.1 | 8 |
| 12 | Westerly | | 52.0 | 10 | Westerly & northerly | | 32.6 | 7 |
| 13 | Southwesterly | | 56.9 | 5 | Southerly | South. | 33.6 | 5 |
| 14 | Southeasterly | South-southeast. | 54.9 | 8 | Westerly | West. | 35.8 | 8 |
| 15 | South-southeasterly | | 53.4 | 10 | do | | 37.4 | 13 |
| 16 | Westerly | West. | 52.9 | 7 | do | | 38.0 | 11 |
| 17 | Northeasterly | East and north. | 49.9 | 5 | North-northeasterly | North-northeast. | 34.3 | 5 |
| 18 | Easterly | | 45.0 | 13 | Southerly & westerly | Southwest. | 32.6 | 10 |
| 19 | Southeasterly | Southeast. | 44.9 | 8 | Westerly | West and north. | 36.3 | 8 |
| 20 | Easterly | East and north. | 44.8 | 8 | West-northwesterly | | 40.0 | 16 |
| 21 | East-northeasterly | | 41.1 | 5 | Westerly | | 37.3 | 10 |
| 22 | do | | 36.5 | 18 | West-northwesterly | | 38.4 | 15 |
| 23 | Easterly | | 29.0 | 15 | West-southwesterly | South and west. | 38.5 | 13 |
| 24 | East-northeasterly | | 23.5 | 11 | Westerly & southerly | | 40.4 | 11 |
| 25 | Easterly & northerly | | 23.1 | 4 | Southerly & westerly | | 37.5 | 15 |
| 26 | Northerly & westerly | North and west. | 26.7 | 7 | Southerly | | 33.6 | 20 |
| 27 | North-northwesterly | | 27.4 | 11 | Southerly & westerly | | 35.1 | 13 |
| 28 | Southwesterly | South and west. | 32.9 | 4 | Southerly & easterly | South and east. | 35.1 | 16 |
| 29 | Southerly | | 29.8 | 11 | Southerly | | 32.8 | 5 |
| 30 | Southerly & westerly | | 35.8 | 10 | Westerly & northerly | West and north. | 29.1 | 5 |
| 31 | Northwesterly | Northwest. | 39.1 | 0 | | | | |
| | *Summary.§* | Av. Temp. for Oct., 1889 | 44.4 | | *Summary.§* | Av. Temp. for Nov., 1889 | 35.6 | |
| | E. 10 | | | | W. 14 | | | |
| | S. E. 8 | | | | S. 12 | | | |
| | W. 5 | Mean Temp. for Oct., 121 years | 40.1 | | N. 6 | Mean Temp. for Nov., 121 years | 29.1 | |
| | S. 5 | | | | E. 4 | | | |
| | N. E. 4 | | | | N. W. 4 | | | |
| | N. 3 | | | | S. E. 3 | | | |
| | N. W. 2 | | | | N. E. 2 | | | |
| | S. W. 2 | | | | S. W. 1 | | | |

* Compiled from three tables, supplied by the U. S. Signal Service, "Copied from the Bulletins of the Physical Central Observatory, St. Petersburg, Russia."

† Two observations only.

‡ Velocity expressed in miles per hour.

§ The number of times in which the wind prevailed from each of eight points of the compass.

## *Winds and the Causation of Influenza and Allied Diseases.*

It is apparent, I think, to any one who will examine the histories, that epidemics of influenza frequently, perhaps generally, follow winds. The tables and diagrams which I present herewith prove that increase in influenza generally follows increase in the wind*. In England the records not infrequently mention east winds. Winds probably contribute to the causation of influenza in several ways:—1. By causing a general drying of everything. (The drying influence of wind is well-known to all women who hang clothes out of doors to dry.) Unless saturated with moisture, air will absorb it from moist surfaces, and then, if when saturated, that air is moved on, and is replaced by air not saturated, the drying process continues so long as the wind continues. The *relative* humidity of the atmosphere is generally greatly lowered after high winds. When the wind comes to us from a place colder than ours, its drying powers are observed to be especially great, its moisture has been cooled out of it (fallen as rain or snow) leaving the air dry, absolutely. The inhalation of such cold dry† air is followed by influenza. That this is true of ordinary *non-epidemic* influenza is proved beyond question by the tables and diagrams which I present with this paper, and which include observations extending through many years*. Other evidence in this paper proves, to my mind, that *epidemic* influenza generally follows the inhalation of cold air. This is proved by Table 2, pages clxxvii-clxxviii, and is graphically shown, for the epidemic in Michigan in 1879, in Diagram 3, page clxv.

My belief, (based upon evidence some of which is presented herewith) is that one important reason why cold air causes influenza (and allied diseases) is because it abstracts moisture unduly from the moist mucous membrane of the air-passages. This action is intensified by the wind.

2. Probably, wind may contribute to the causation of influenza and allied diseases, by chilling the surface of the body, stopping insensible perspiration, leaving more salts and excretory products to be excreted by the kidneys and lungs, especially as, by the drying effect on the upper air-passages, an abnormal flow of fluids is required to go there in order to maintain the moisture essential to the performance of function. Possibly the acrid character of the discharge from the nostrils may be due, in part, to substances which normally pass out of the body through other channels.

3. I think it probable that winds contribute to the causation of influenza and allied diseases by bringing to the air-passages of persons, in proportions greater than common, *the various micro-organisms found in these diseases.* It is now well known that these micro-organisms, such as the varieties or species of *staphylococcus pyogenes*, are to be found in the mouths of a very considerable proportion of people generally‡, and this, I think, accounts for the fact that a considerable proportion of the people will have influenza on exposure to sudden changes in certain meteorological conditions; but it has been proved by observation and experiment

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*The tables are printed at the close of this paper, but the diagrams are not all reproduced, only the headings of some of them being printed to indicate the nature and extent of the material studied. Plates 797, 798 and 799, pages following, exhibit the relations of wind, humidity and temperature to influenza in Michigan.

†Air may be so saturated with moisture at a low temperature as to appear as fog, yet its absolute humidity is slight, because cold air cannot contain much water.

‡The proportions are stated on page clxx of this article, under the sub-head "Pathogenic Micro-organisms in the Mouths of Healthy Individuals."

that the number of these micro-organisms in the atmosphere is greater in time of wind than in still air[*]. It has been found that when the wind comes from an *unusual* direction their number is still more increased.[†] Perhaps this fact may well be remembered in connection with the fact that in England the records of epidemics of influenza show them frequently perhaps generally to have been preceded or accompanied by an East wind, as was the case in the recent epidemic in Russia. But *wind* from *any* direction may bring more "germs" to those who have them already, and some to those who had them not, and bring them to air-passages which the cold wind has made "raw", as it is sometimes expressed, and which are thereby made a suitable place for their reproduction and entrance into the body.

4. Wind may favor the causation of influenza and allied diseases by increasing the thoroughness of ventilation of dwellings, cities and villages, removing air containing oxidizable substances, and substituting air containing ozone, which is a powerful oxidizer not usually found in occupied rooms. When artificially prepared and inhaled, it is a strong irritant to the air-passages. As shown by the diagrams which I present, the curve representing atmospheric ozone bears a general resemblance to the curve representing influenza. It should be noticed, however, that there are instances where the change in the ozone did not occur until after the change in the influenza, indicating that ozone is not always the *controlling* cause of influenza, although probably it usually contributes towards its causation. The action of the ozone, at least upon our tests, is apparently in great part controlled by the temperature, humidity, and movement of the air,—*influences* which apparently also control the influenza; and to this fact "Influenza" owes its name, having been so named by the Italians, who as long ago as in the sixteenth century, were wise enough to recognize the fact that the disease was due to atmospheric influences.

5. The relations of wind and of ozone to influenza are dealt with under the sub-head "Direction of movement of the influenza", page clxxiii, also under the sub-head "The Disappearance of ozone in the human air-passages."

6. [Since this paper was read, the wind has been mathematically demonstrated to have very great influence in the causation of mortality from one disease allied to influenza, that disease being the most important one now afflicting mankind, and one which might not, by most people, be suspected of sustaining such a relation; I refer to consumption. Diagrams 1 and 5, prepared to illustrate a paper read before the American Climatological Association, at its meeting in Denver, Colorado, in September, 1890, demonstrate that atmospheric temperature has in general a very close relation to the mortality from consumption, and that the variations from an apparent controlling influence of the temperature were all in that instance apparently due directly or indirectly to the wind. The evidence is so remarkable, complete, and convincing, that those two diagrams are printed herewith, on following pages.]

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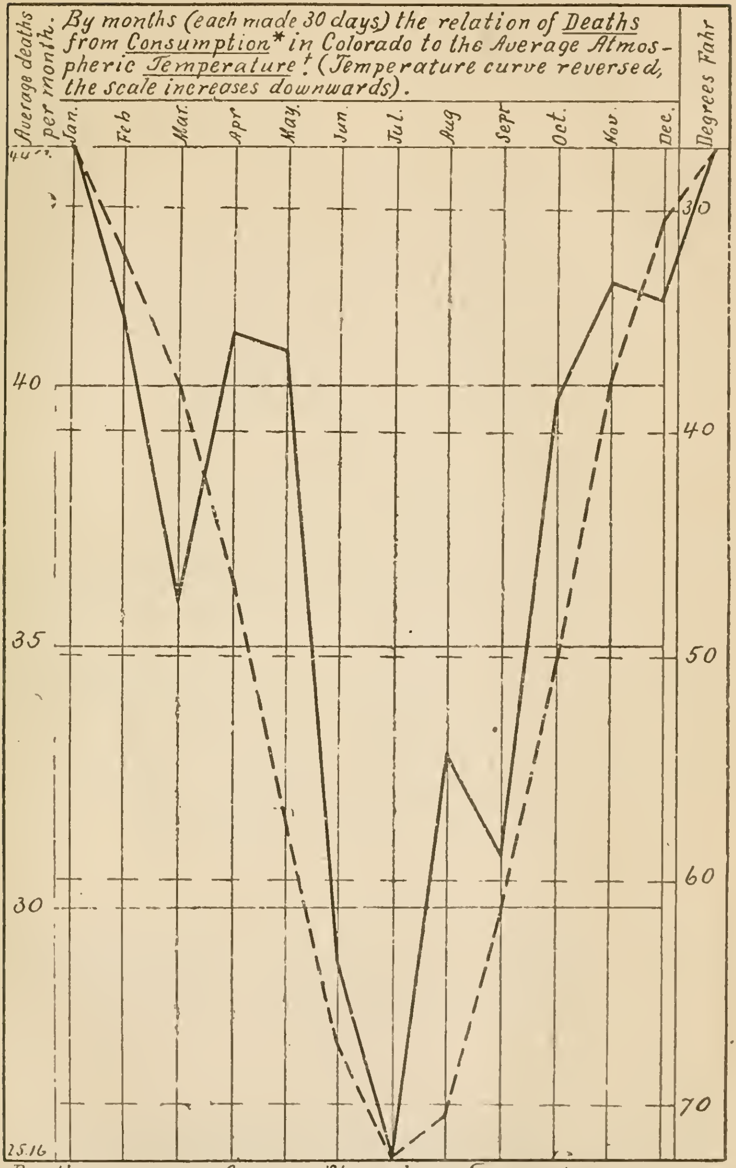
[*] Jour. Am. Med. Assoc., Vol. 16, p. 344, where is reported observations by Prof. Roster, of Florence, who says: When the wind is off the sea the number of bacteria is enormously decreased.

[†] It is not difficult to understand why this is so,—dust that is deposited while the wind continues in the usual direction is quite liable to be disturbed by wind from the opposite direction.

No. 1.— Consumption, and Temperature in Colorado.

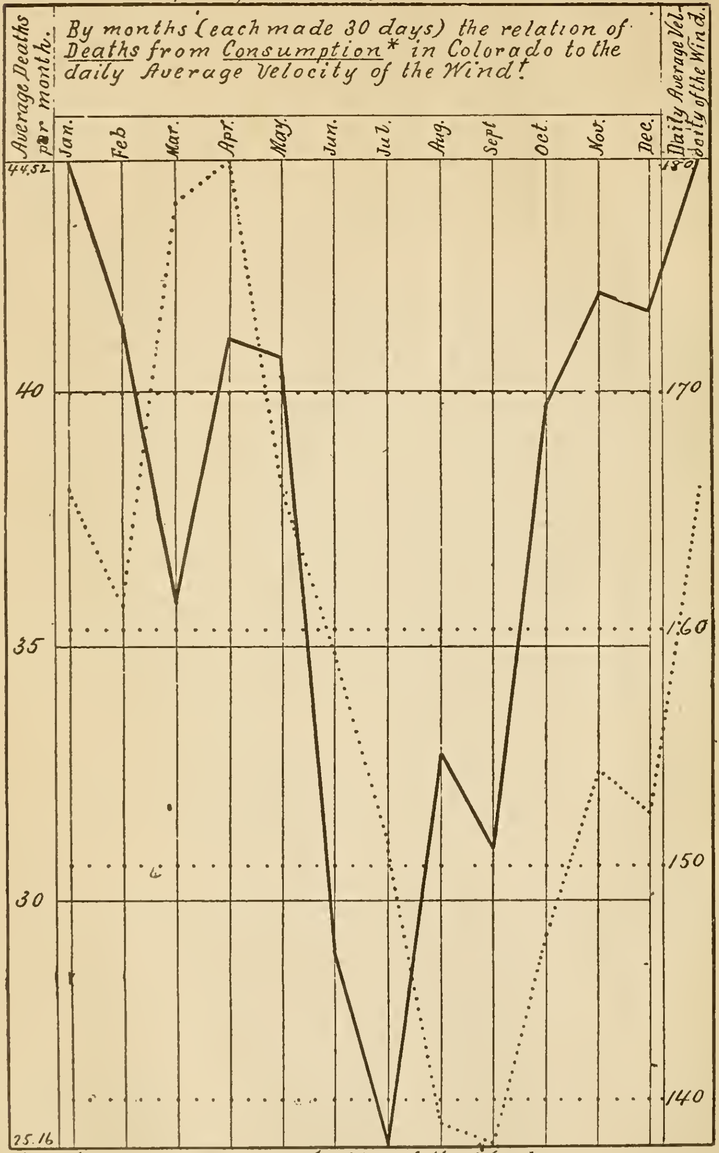


By months (each made 30 days) the relation of Deaths from Consumption* in Colorado to the Average Atmospheric Temperature† (Temperature curve reversed, the scale increases downwards).

Deaths ———. Average Atmospheric Temperature — — —.

*The Temperature curve represents the Average for a period of 16 years, 1872-87. The data are from the Reports of the Chief Signal Officer, U.S. †The curve for Deaths from consumption represents the deaths occurring in Colorado during the census year 1870, in Denver during 1889, in Colorado Springs and in Boulder during a long series of years.

No. 5.– Consumption, and Velocity of the Wind in Colorado.



·Deaths ——————. Velocity of the Wind ..................

*The curve for consumption represents the deaths occurring in Colorado during the census year 1870, in Denver during 1889, in Colorado Springs and in Boulder for a long series of years.

†The curve for velocity of the wind represents the daily average for 16 years, 1872-87, at Denver, Colorado. The data was supplied by Sergt. J. J. Gilligan, U.S. Signal Service Denver, Colorado.

It must be admitted, however, that it is often much easier to recognize, in nature, a relation of cause and effect, than it is to establish on a sound scientific basis the fact of the existence of such a relation; and this last is the work involved in this present paper, to which widespread beliefs contribute something of value, even when the underlying evidence which caused them cannot be obtained.

One of the most remarkable instances, however, of the statement of what is probably a true relation of cause and effect between ozone and influenza occurred in the United States before any systematic observations of ozone had been made in this country, and, although possibly based upon the views of a foreigner who had studied ozone very carefully, it is remarkable that a number of medical reporters in the State of Minnesota should have come to the conclusion stated in the closing sentence of the following statement, and which conclusion, it seems to me, has been demonstrated, by the extensive data since collected in Michigan, to be correct relative to influenza in Michigan in every year as well as in epidemic years. The statement is as follows:—

"Dr. Hewitt of Red Wing, Minn., in the Transactions of American Medical Association for 1871, p. 218, has the following:

"'The peculiar atmospheric condition which is the cause of our epidemic influenza is now attracting deserved attention, and it is hoped that the recent offer of a prize by the State Medical Society may result in investigations of practical value. This much is known: that when influenza is *markedly* epidemic, zymotic disease diminishes in severity, becomes less frequent, and disappears. Though as yet no sufficient test has been used, the majority reporting (judging from its action on 'civic miasm,' which seems that of an oxidizing agent, and from reports of its study elsewhere) believe it to be ozone.'"*

In the above quotation, the term zymotic disease probably does not now convey just the same idea as it did in 1871; but it may be mentioned in passing, that in Michigan the curve representing the increase and decrease of sickness from remittent fever follows quite closely the inverted curve of the increase and decrease of atmospheric ozone—the more ozone the less remittent fever. Another instance of popular recognition of conditions causative of influenza is chronicled as follows:—

### *Causation of Influenza.*

The Pall Mall Gazette, London, Dec., 10, 1889, says:—"Everybody in England, when the east winds blow, when the fog gathers, when the rime is on the windows, knows what an 'influenza cold' is".†

### *Winds, Communicability, and Epidemic Movement of Influenza.*

Inasmuch as *influenza* is always present in this country, (it is never entirely absent from Michigan, and probably not from any northern State) the *cause* of influenza is therefore always present in this country, but there is probably truth in the common belief that its cause is sometimes carried "on the wings of the wind," in the ways previously suggested. It seems necessary also to consider how through the influence of wind, and cold atmosphere, conditions are supplied for the unusual entrance into the body, and unusual multiplication of its cause.

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* Report Michigan State Board of Health, 1875, p. 139.
† Public Health in Minnesota, Jan., 1890, p. 111.

# Diagram 7.—Relation of Wind to Influenza in Michigan.

By months, for the ten years, 1880-9, the Relation of the average velocity of the wind in miles per hour, to the Average Sickness from Influenza, stated in Percent of all weekly reports which reported it present

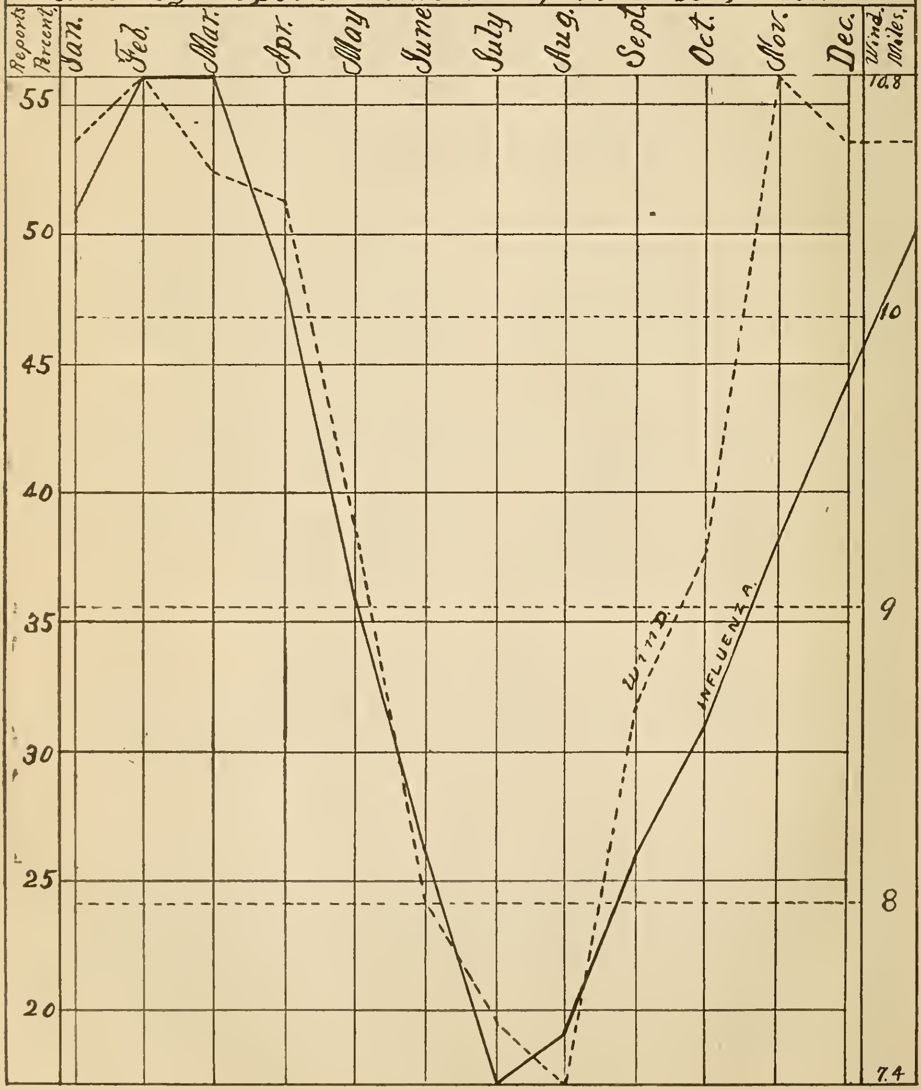

PLATE NO. 797.

Although the movement of influenza from place to place is, I think, in part, apparent and not real, the epidemic rise of the disease being due to the conditions of the atmosphere, which may be similar at the same time at many different places, or which are likely to occur in some parts of the world soon after their occurrence in other parts, yet the evidence of the communicability of the disease in several instances seems to be convincing; and these two facts are in harmony if we suppose that what is true of the air-passages of the individual is also true of the locality,—that is, that just as, by reason of the atmospheric conditions, the micro-organisms generally present in the nose or mouth of the individual are brought into the air-passages and greatly increased in numbers and more productive of influenza, so, through the drying of the profuse nasal fluids on handkerchiefs, and in other ways these micro-organisms are spread about in the locality in greatly increased numbers, the inhalation of these "germs" is more general, more people than usual get them, and those who had them get more of them than usual. This, I think, explains the fact that an epidemic of influenza, once started by extreme atmospheric conditions in any part of the world tends to spread even to parts of the world where the atmospheric conditions are not bad. But in warm moist localities the mortality is not often great. The disease may even pass as "hay fever" or dengue. This recent epidemic is generally believed to have had its origin in St. Petersburg, although it is alleged that the disease had occurred in May, 1889, in Iceland,* and in Greenland in the spring of 1889.†

But it should be noticed that this great epidemic, like the preceding ones, started on its course at a season of the year when the atmospheric conditions were constantly becoming more favorable to the spread of this disease,—that is it was becoming colder.‡ And it reached its maximum prevalence in Michigan in precisely the same month in which it usually does, as is shown by comparing Diagram 4, page clxvi with Diagram 1, page clxiii, which exhibits its rise and fall by months, according to experience extending through twelve years, showing that influenza is at its minimum in July, rises rapidly as cold weather increases, and reaches its maximum in February, then falls to its minimum again in July.

### *The Spreading of Influenza.*

The fact that in the first week of the epidemic a large proportion of the deaths from all causes, in Paris, France, were of males while in the last week of the epidemic the proportion of females had greatly increased,§ is, apparently, evidence that the males got the disease by exposure, and communicated it to the females. This might occur because the males traveled about more and came in contact with more people; or because they were more exposed to the atmospheric conditions out of doors. Probably both these explanations are true. The last certainly seems to be true, because even at the last, the proportion of males was greater than that of females; and because among males the disease has attacked those most exposed to out-door conditions.

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* Address of the chairman of this Section, at this meeting,—Dr. J. B. Hamilton—Jour. Am. Med. Assoc., May 31, 1890, p. 782.

† Sanitary Record, April 15, 1890, p. 498.

‡ This is especially true of the condition at St. Petersburg, as shown by the table prepared for me by the Office of the Chief Signal Officer of the U. S. Army, extracts from which table accompany this paper, in Table 4, page clxxxii.

§ Therapeutic Gazette Feb. 15, 1890, p. 136:—

Last week in Dec. males, 772; females, 415=53.6 per cent.
First week in Jan., 1890, males, 1,470; females, 1,213=82.5 per cent.
Second week in Jan., 1890, males, 1,121; females, 944=84.2 per cent.

Speaking of the death-rate in Paris for the week ending January 4, 1890, "The deaths of males aged between twenty and forty years were more than double those of females at the same age; while among persons aged upwards of sixty years the deaths of females exceeded those of males.*

Observations of similar apparent disproportions of the sexes among decedents during the epidemic have been noticed in some other cities. Thus in Baltimore, Md., it was stated: "A notable fact in connection with the deaths is, that the weaker sex is not dying in as large numbers as the males, which would indicate either that the females are better able to withstand the attacks of the disease germs, or that the male population out-numbers the female and has proportionately a larger death rate. Of the 267 deaths, 150 were males, and 117 were females; there were 64 boys, and only 36 girls."†

These facts are in harmony with the belief that influenza is caused by an ordinary micro-organism, or by a group of micro-organisms, which, like Staphylococcus pyogenes, is, not infrequently, present in the human air-passages, and which, when the germs gain entrance far enough and in *sufficient numbers* are capable of causing influenza, even in a person not unusually exposed to cold out-door air; but that exposure to certain atmospheric influences tends greatly towards the entrance and multiplication of these micro-organisms in the air-passages of the head and lungs, and toward the causation of the disease in persons who if not exposed to the conditions which cause them to "take cold" would not contract the disease.

### *The Relation of Ozone to Influenza.*

In the sickness statistics collaborated with the meteorological data, for many years in Michigan, there is abundant proof that there is some necessary and apparently a causal relation between atmospheric ozone and sickness from influenza. This is demonstrated by Diagram "No. 8" printed herewith. (page cxci.)‡ But it has several times been observed that an increase in the atmospheric ozone has occurred *after* the increase in the influenza. How can this be explained? One explanation might be—that the same influence which promptly increased the influenza later increased the ozone. This might be, for instance, a low temperature, which is proved to have a tolerably constant relation to influenza and which tends toward a lessened destruction of ozone by dis-association of the three atoms of oxygen which unite to form ozone, and therefore toward its accumulation in the atmosphere; or it might be the wind, which also bears a somewhat constant relation to influenza, and which brings more air to the test paper, and therefore tends to increase the amount of ozone apparent. Another explanation may perhaps be found in two facts,—first, that our tables and diagrams of atmospheric ozone deal with only the *residual* ozone—that which remains after all easily and rapidly oxidizing substances have been oxidized; and second, that no such residual ozone is ordinarily found in inhabited rooms. (One more fact is needed in this connection, namely, whether or not in those instances in which the residual atmospheric ozone increases after the influenza has increased, ozone is then to be found present in inhabited rooms. So far as I know, no one has ever made any observations which can be used to supply this information.)

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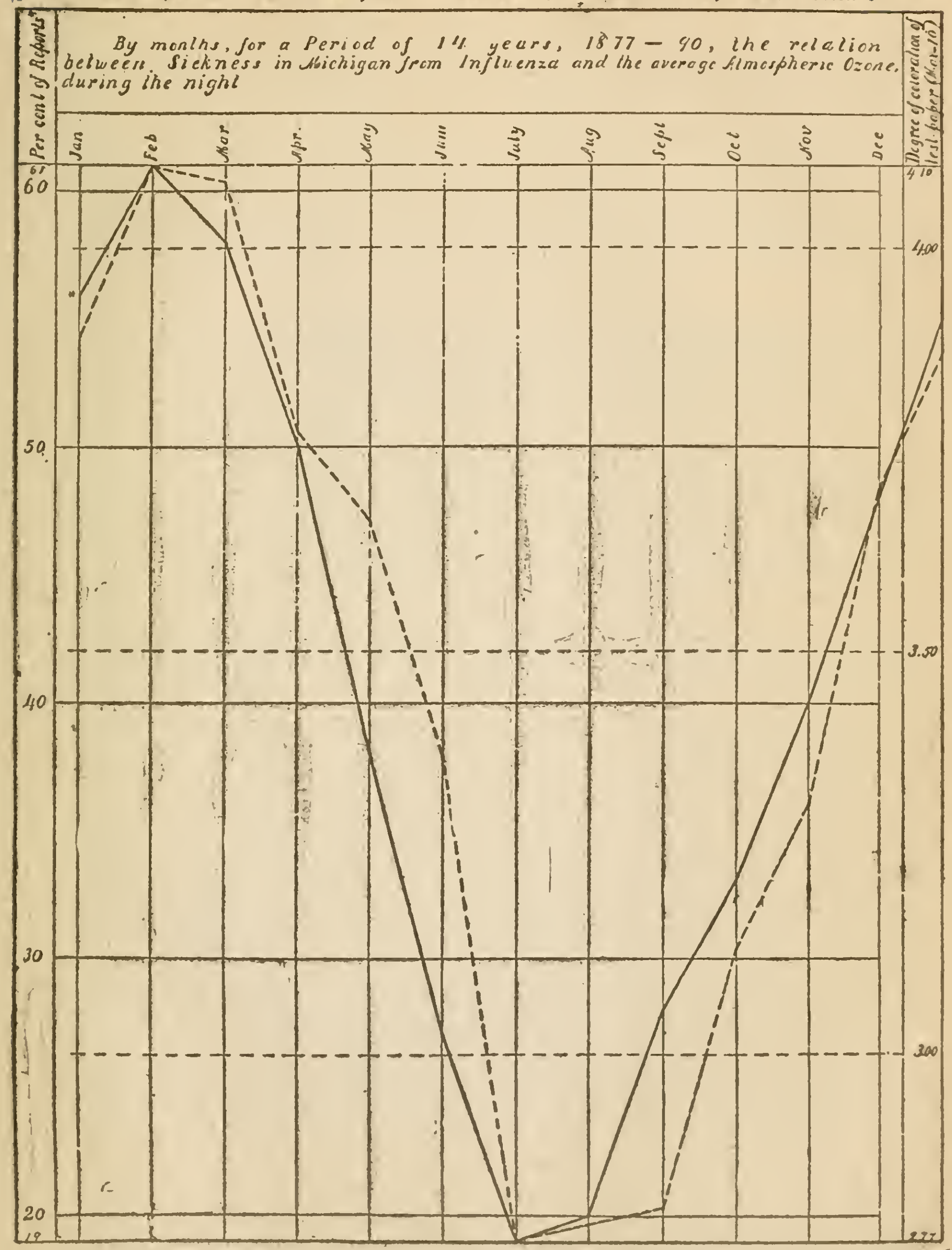
* British Medical Journal, Jan. 18, 1890, p. 146.

† Baltimore American, Jan. 26, 1890.

‡ The tabular data for Diagram 8 are in Table 6, page ccix.

**NO. 8.—ATMOSPHERIC OZONE, AND SICKNESS FROM INFLUENZA, IN MICHIGAN.**



*Sickness from Influenza* ———————— *Atmospheric Ozone, Night* — — — — - -

* *Indicating what per cent of all reports received stated the presence of Influenza then under the observation of the physicians, reporting:*

*Over 59,000 weekly reports of sickness, and over 69,000 observations of atmospheric ozone are represented in this diagram.*

### *The Disappearance of Ozone in the Human Air-passages.*

The fact that no residual ozone is ordinarily found in inhabited rooms, seems to imply that, ordinarily, all the ozone is used by the human life-processes, probably mainly, primarily, in the air-passages and lungs. This may explain the fact, encountered experimentally by Benj. Ward Richardson, M. D., that air which had been breathed and no longer useful in maintaining life, yet contained much oxygen; probably the air was no longer useful for the reason that the oxygen atoms were not so grouped as to make of them active oxygen or as we call it—ozone. Dr. Richardson's experiments seem to prove that the human life-processsses are slowed, and finally come to a stop when the ozone is diminished and finally exhausted.

Under conditions the reverse of these, it is reasonable to assume that the human life-processes are hastened and increased, and that in localities where observations of ozone are made, (which have thus far been near inhabited buildings) the ozone is used nearly as fast as formed, and that its main use is in the bodies of persons and animals, therefore the tests for residual atmospheric ozone do not show any increase or at least not the greatest increase until after ozone shall have been formed in excess of its possible destruction by the life-processes of persons and animals. To explain why influenza sometimes, though unusually, declines before the maximum ozone is reached, it may be supposed that in such instances nearly all persons susceptible to the disease have already had it recently, and are, therefore, unusually protected from exposure to outdoor air.

Probably the most important reason, however, why the apparent effect on the ozone sometimes lags behind the effect on the human organism, is as follows:—

The ordinary, Schönbein, test for ozone may not yield results exactly comparable to the effects on the human organism, for the reason that the test paper is exposed while dry, and the human air-passages are constantly moist. It is well known that if the test paper be moistened the ozone acts upon it much more readily, the inference is plain that in moist weather the test shows comparatively too much, and in dry weather too little ozone. Inasmuch as dryness of the air is now known to be an important factor in the causation of influenza and other diseases of the lungs and air-passages (Demonstration of this has been supplied in my previous papers, and may be found in this paper under the sub-head "Influenza and humidity of the atmosphere,") it follows that at such times as dryness is most effective in causing influenza, the tests for ozone because of the extreme dryness of the paper probably do not show as much ozone as there is present in the atmosphere; and so soon as the air becomes more moist, and this dryness an important cause of influenza is removed, the test for ozone shows porportionately an increased amount.

### *Excessive Oxidation as a Factor in the Causation of Influenza.*

If, as is indicated by the experiments by Dr. Richardson, ozone in normal quantity is essential to the life-processes throughout the body, it is reasonable to believe that when an excess of ozone is inhaled, not all of the excess will be used in the abnormal oxidation of the air-passages and lungs, but that a considerable proportion of the excess will take the same course as when a less quantity is inhaled—it will enter the circulating blood, and go throughout the body, and will first oxidize those tissues which are most easily oxidized, and if continued in excess will finally abnormally oxidize tissues and fluids throughout the body.

Probably the tissues most liable to suffer first are those most easily oxidized, and those in most severe and most constant activity. The brain and nerve tissues are easily oxidized, and in many persons the brain and nerves would be in most constant activity; while in some persons the alimentary canal and digestive organs will have been overworked or irritated, and thus suffer from over-stimulation by ozone. But, in every person, the heart muscle is the most constantly-active organ in the body, except that small portion of nerve substance near the base of the brain which never sleeps but continually presides over the action of the heart and respiration, and acts as a heat-regulating center.

It is precisely in the order indicated by the foregoing considerations that the most prominent effects of influenza are usually observed and reported, —there is heart failure, nervous prostration, and great disturbance of the heat-regulating apparatus; in some instances the suffering from cold feet and legs being very great.

It is established that atmospheric ozone bears a close relation to influenza. It is reasonable to conclude that the relation is causal. In recent years there have been extraordinary fluctuations in the atmospheric ozone—greater than ever before known, since systematic observations of it have been made. In recent years there have been extraordinary fluctuations in the sickness from influenza, greater than ever before known during the time covered by the ozone observations.

If it is conceded that ozone in excess causes influenza, can we trace the excess of ozone to its cause, and thus gain a hint of what to counteract or take account of in our effort to prevent influenza? In answer to the foregoing question,—the great fluctuations, both of the ozone and of the influenza, have occurred since or coincident with a great change in human custom which has now come to be world wide. The change referred to is one from universal methods of illumination at night whereby ozone was destroyed, toward the adoption of methods whereby ozone is not destroyed namely by incandescent lamps; and toward methods whereby ozone is believed to be produced, by the action of electricity on atmospheric oxygen. Coincident, also, is a change from universal methods of locomotion whereby ozone was destroyed, toward electrical methods whereby ozone is believed to be produced. It is proposed to continue similar changes, until the great cataracts and falls shall do much of the world's work in the factories. In the great increase in the transmission of electricity there must be great increase in the escape of electricity through the atmosphere, and in the production of ozone. Does it not behoove humanity to be active and earnest in the search for knowledge of the influences which these great changes are exerting on human health and life? The resources at my command are entirely inadequate to complete the investigations which should be carried on in this connection. The experiments which I have undertaken have been meagre; but, so far as they extended they indicate that there is reason to believe that the world-wide changes toward the production of electricity have had great influence in those great fluctuations in atmospheric ozone which have occurred within a few recent years; and there is reason to believe that this has had influence in the causation of the excessive amount of influenza which has been more or less coincident therewith.

### *Is Excessive Oxidation an Important Factor in the Causation of Influenza?*

C. C. Byrne, Lieut. Col. and Surg. U. S. A., in charge of U. S. Soldiers' Home, Washington, D. C., noticed a very remarkable immunity to influenza enjoyed by the inmates of the Soldiers' Home at the time of the epidemic influenza. While families and officers at the home suffered severely and generally, the old soldier inmates were almost entirely exempt, notwithstanding there was little or no restraint placed on the movements of the inmates. Dr. Byrne says: "Possibly the drinking habit may have some influence upon the susceptibility of individuals. Nearly all of the inmates here indulge more or less in alcoholic stimulants, and many are steady and excessive drinkers.. My impression is that among the inmates who suffered from the epidemic there were none of decidedly intemperate habits. The few officers here are all strictly temperate as, of course, are the women and children; yet it was these classes that suffered the most from the influenza." In connection with the foregoing, three paragraphs from "The Address on Medicine" at the meeting of the American Medical Association, Nashville, Tenn., May 21, 1890, by N. S. Davis, M. D., LL. D., are of interest:

"1. Alcohol, when present in the blood, either combines with or causes changes in the molecular composition of the hæmoglobin, by which the natural conversion of the latter into oxyhæmoglobin is diminished, and consequently less oxygen is carried from the pulmonary to the systemic capillaries.

"2. The same strong affinity of the alcohol for water and albuminoids that enables it to modify the composition and function of the hæmoglobin of the blood, also causes it to modify the molecular condition and functions of the tissue cells throughout the body, and thereby retard or lessen the aggregate of metabolic changes and their products, as shown in the diminished product of carbon-dioxide, urea, phosphates, heat, etc.

"3. Both the direct effect of the alcohol on the nerve cells, and its indirect effect in lessening the amount of oxygenation of the blood, causes it to produce marked diminution of nerve sensibility and vaso-motor nerve force; or, in other words, a true anæsthetic effect upon the nerve centres."*

### *Influences of Directions and Sources of Winds on Amounts of Atmospheric Ozone.*

The subject of the relations of ozone to influenza, in connection with the subject of the direction from which the wind blows, is discussed briefly on page clxxiii under the sub-head "Direction of movement," etc.

If the atmospheric ozone is generally used nearly as fast as formed, and is formed in great part by the sun's light and by electrical influences direct from the sun, it follows that wind from a direction and part of the earth or ocean over which the sun has just passed, as, for instance, an easterly wind in the afternoon, will be likely to bring with it more ozone than will, for instance, a westerly wind in the morning, which comes from a direction and portion of the earth over which for many hours the influence of the sun has not been exerted. If a large part of the usual destruction of ozone is by its use by living beings, it is important to consider, for each locality, whether winds from different directions do or do not bring air from a portion of the country which is thickly inhabited, or from over an uninhabited country covered with vegetation which is constantly giving off oxygen, or from over the ocean.

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* Jour. Amer. Med. Assoc., May 24, 1890, p. 751.

### *Atmospheric Temperature and Sickness from Influenza.*

Of all meteorological conditions, the one most constantly related to influenza is the temperature. Although there are exceptional instances in which increased cold is not followed by influenza, and even epidemics in years when the weather is warmer than is usual at that season of the year, still the fact remains that in every series of years yet studied the influenza has been quantitatively related to the atmospheric temperature, the increase in the influenza has followed a lowering of the temperature and the decrease in the influenza has followed a rise in the atmospheric temperature.

Exhibit 4, this page, shows that in 1879 in January and February of which year the influenza was epidemic in Michigan, the atmospheric temperature in January was 3.21° lower than the average January in the preceding fifteen years, and in February it was nearly four degrees (3.97°) lower than the average.

The close relation of atmospheric temperature to influenza is shown by Diagram 3, page clxv.

EXHIBIT 4.—*Comparison of the Average Temperature during the Year and during each Month of the Year 1879, with the Annual and Monthly Averages for the Year 1878, and with the Average for the Fifteen Years 1864–78.—Observations made by Prof. R. C. Kedzie, at the State Agricultural College,* near Lansing, Michigan.*

| Years, etc. | Average (Mean) Temperature.—Degrees Fah. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. for 15 yrs., 1864–78 | 46.64 | 22.40 | 24.37 | 31.49 | 45.98 | 58.10 | 68.42 | 72.01 | 69.13 | 60.34 | 47.45 | 35.21 | 25.00 |
| 1878 | 48.29 | 29.11 | 28.07 | 40.90 | 50.55 | 54.57 | 64.08 | 73.04 | 70.15 | 63.15 | 48.33 | 36.29 | 21.29 |
| 1879 | 46.88 | 19.19 | 20.40 | 33.19 | 44.84 | 58.76 | 66.02 | 74.03 | 70.00 | 56.21 | 57.28 | *38.22 | *27.46 |
| In 1879 Higher than Av. 15 years, 1864–78 | .24 | ------ | ------ | 1.70 | ------ | .66 | ------ | 2.02 | .87 | ------ | 9.83 | 3.01 | 2.46 |
| In 1879 Lower than Av. 15 years, 1864–78 | ------ | 3.21 | 3.97 | ------ | 1.14 | ------ | 2.40 | ------ | ------ | 4.13 | ------ | ------ | ------ |
| In 1879 Higher than in 1878 | ------ | ------ | ------ | ------ | ------ | 4.19 | 1.94 | .99 | ------ | ------ | 8.95 | 1.93 | 6.17 |
| In 1879 Lower than in 1878 | 1.41 | 9.92 | 7.67 | 7.71 | 5.71 | ------ | ------ | ------ | .15 | 6.94 | ------ | ------ | ------ |

*For November and December, 1879, the observations were make by Harry B. Turner, at the office of the State Board of Health, Lansing.

Some of the ways whereby low temperature may tend to cause influenza have been suggested on pages clxxii-clxxiii. Other considerations will be presented in connection with the subject of humidity of the atmosphere, pages cxcvii-ccii.

Diagram 10.— Atmospheric Temperature and Influenza in Michigan.

Exhibiting, by months, for the 13 years, 1877-'89, the Average Atmospheric Temperature, and the Average Percentage of Weekly Reports showing sickness from Influenza.
(The temperature line is reversed: scale reads downwards.)

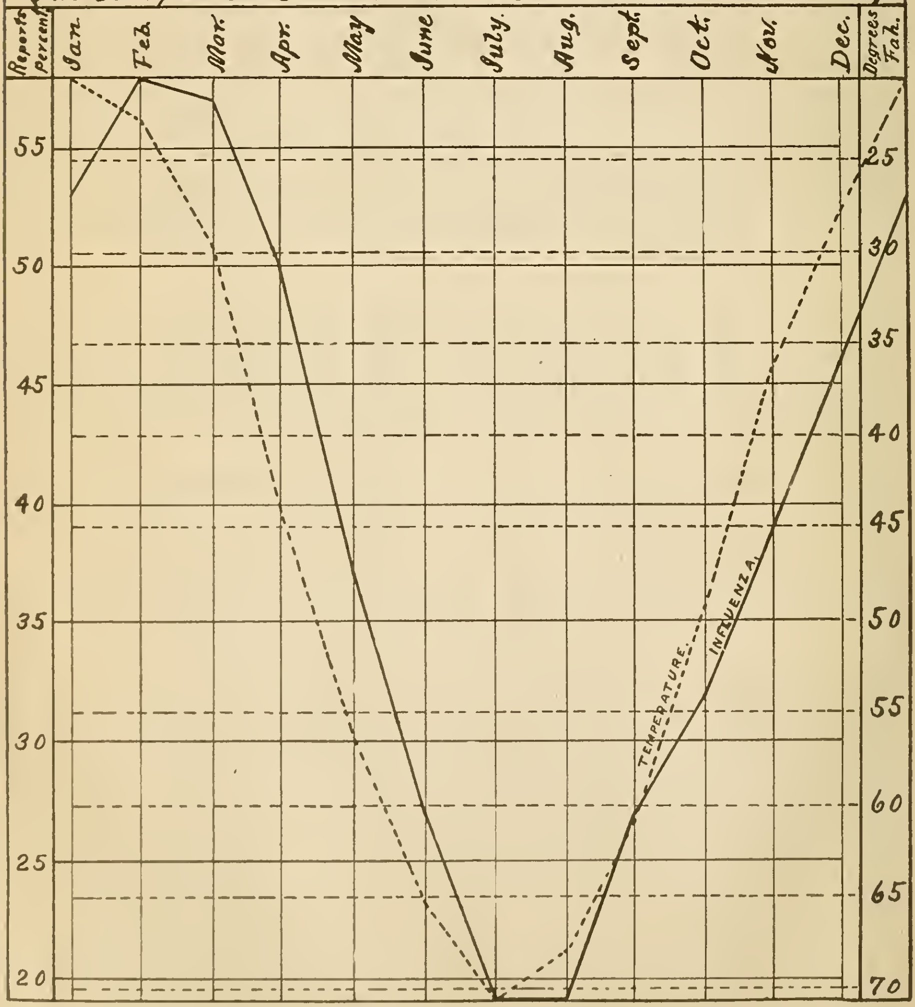

PLATE NO. 799.

### *Warm-weather, Influenza, Pneumonia, etc.*

To the facts which in the times past I have offered, proving that both in cold and warm climates the diseases of the respiratory organs increase after cold weather, and decrease after warm weather, an objection to the acceptance of my evidence has been made that in some warm climates diseases of the respiratory organs have been more prevalent and fatal than they have been in some colder climates. This objection is based upon the assumption that, if it is the cold that, directly or indirectly, causes these diseases, then these diseases should be more prevalent and fatal in cold than in warm climates. Of course this does not necessarily follow; it is a question to be determined by evidence.

It seems to be a fact, however that although the recent epidemic of influenza has followed weather unusually warm for the season of the year for the locality, yet the epidemic has not visited to any great extent some of the southern cities in the United States in which the temperature has been considerably warmer than in those northern cities in which the epidemic was quite fatal. This shows that something more than *warm* weather is needed to cause serious trouble from this disease.

### *Exposure to Heat one of the Greatest Causes of Disturbance of Body Temperature.*

To the ordinary observer of influenza, one of the most perplexing combinations of facts is: that while the disease seems to be caused by exposure to cold, yet epidemics come when the weather is extraordinarily warm for the season of the year. Not only so, but influenza has been known to be epidemic in the warmest month of summer, and in some parts of this country, is never entirely absent at any season of the year. (This may be seen by reference to the tables and diagrams showing the rise and fall of the disease in Michigan.) In this connection it should be remembered that heat is a powerful agent tending to relax the muscular systems, voluntary and involuntary, and to debilitate the heat-regulating apparatus of the human body.

### *Relapses are more Noticeably due to Cold than are First Attacks.*

Drs. Robertson and Elkins who reported carefully 140 cases with 13 relapses, said: "As a general rule the second attack was more serious than the first, and headache and fever always recurred." * * * * "In all relapsed cases there was some distinct exposure to cold air, usually by going out of doors too soon, *and in no case did a relapse occur so long as the patient was in bed or strictly confined to a heated room.*[*] The period elapsing between the exposure and the symptoms of the second attack was very short; in 4 of the 13 cases the relapse occurred the day after going out of doors, and in three others it occurred within 24 hours of leaving the heated sick room for the purpose of going to the water-closet where ventilation is active."[†]

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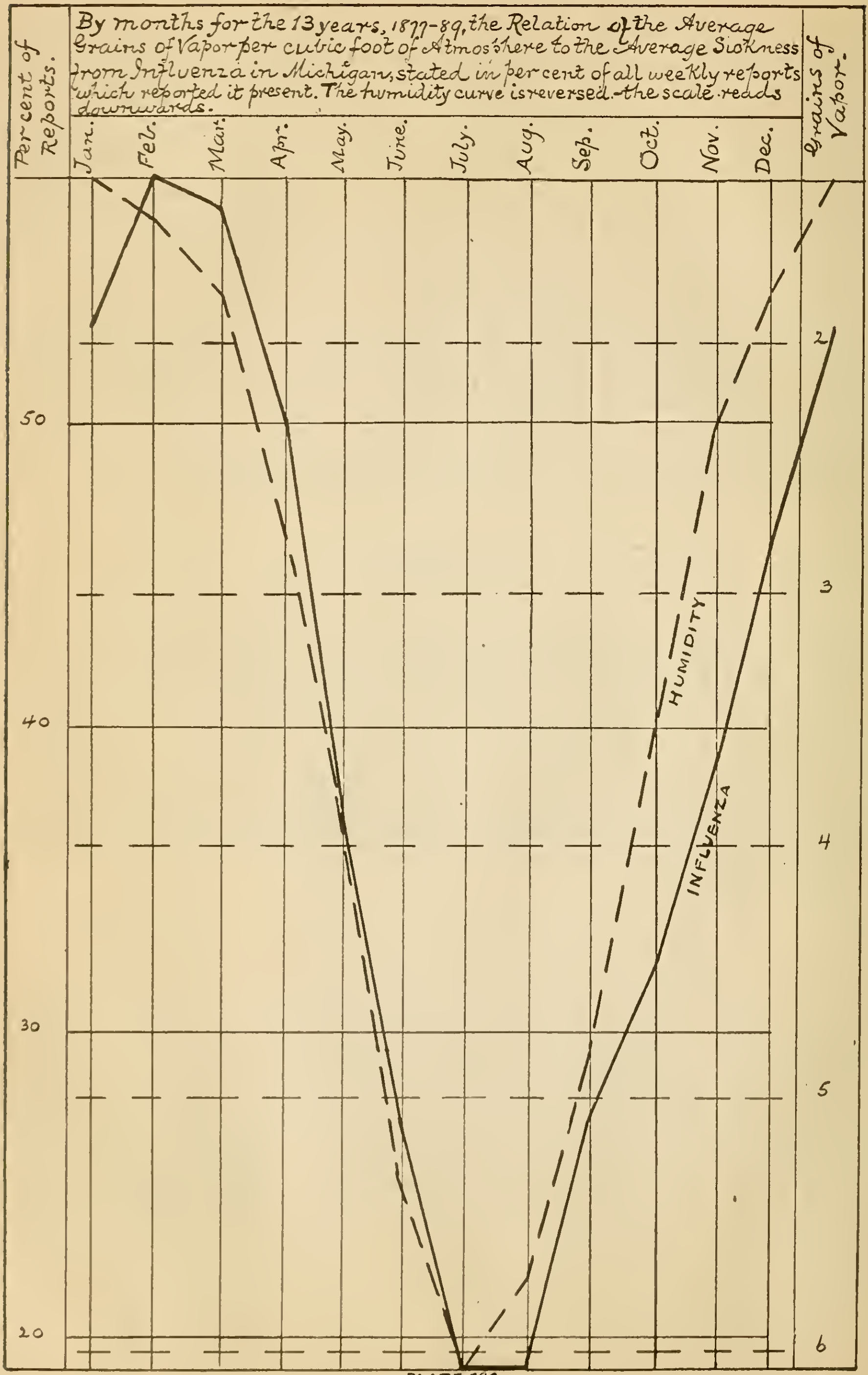
[*] Italics mine.

[†] British Medical Journal, Feb. 1, 1890, p. 229.

DIAGRAM 9.- RELATION OF HUMIDITY TO INFLUENZA.



By months for the 13 years, 1877-89, the Relation of the Average Grains of Vapor per cubic foot of Atmosphere to the Average Sickness from Influenza in Michigan, stated in per cent of all weekly reports which reported it present. The humidity curve is reversed—the scale reads downwards.

PLATE 798.

### *Why are the Relapses More Serious than the First Attack?*

The universal experience seems to accord with that stated by Drs. Robertson and Elkins "As a general rule the second attack was more serious than the first." This is easily explained, and must necessarily be so, if my view of the caustion of influenza is accepted; because on the second exposure there would very likely be more of the micro-organisms present in the nose, mouth and air-passages, and in the surroundings of the person, than on the first exposure.

### *Atmospheric Humidity and Influenza.*

That the absolute humidity of the atmosphere has very close relation to influenza is shown in Diagram 9, on the page opposite this. The data exhibited in the diagram is contained in Table 8 continued, page cciv.

One of the most remarkable instances of extraordinary meteorological conditions preceding influenza, is the following:—

Dr. Frank G. Clemow, recently returned from St. Petersburg, read a paper at the meeting of the Medical Officers of Health, London, March 14, on "Epidemic Influenza." He cited "the historical instances of half a million persons being seized in London in 1847 in a few days; and of 40,000 in St. Petersburg in 1782, while the thermometer rose 92 degrees between 2 A. M. and 6 P. M., from 47° below zero F. to 45° above."*

Air at zero, saturated with vapor of water, can contain only half a grain in each cubic foot, and the quantity decreases as the temperature is lowered, so that at 47° below zero the air is practically free from vapor of water. As the temperature of air is raised its capacity for moisture is increased, and if rapidly raised in temperature its drying effect on every moist surface would be great.

Although in this instance the temperature change was the one which attracted public attention, the condition probably causative of influenza in St. Petersburg in 1782 was the extreme dryness and drying influence of the atmosphere, which under the circumstances mentioned would necessarily be extraordinary.

### *Humidity and other Meteorological Influences, Influenza and Allied Diseases, and the Salts of the Blood.*

That the salts of the blood play a very important part in pneumonia, and in other diseases induced or aggravated by cold, there can be no doubt. For our knowledge of the subject we are chiefly indebted to some of the foremost investigators in the medical sciences. In 1850 Redtenbacher published the fact that during the onward progress of pneumonia the chlorides are absent from the urine. In 1852 Lionel Smith Beale, of London, published results of experiments proving that the salt which disappears from the urine is to be found in the sputa and in the solidified lung. Accurate observations, however, on this subject in influenza seem to be rare. The only published analysis of urine which I remember to have seen showed "diminished specific gravity (1017); chlorides diminished (3.834 grammes in a litre)."†

It has been shown that the normal poisons in the urine (leucomaïns?) which in health are fatal to small animals if injected into their bodies, disappear from the urine, as do the chlorides, during the onward progress of pneumonia, and reappear on recovery.[*]

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* Sanitary Record, April 15, 1890, p. 498.
† British Med. Jour., Feb. 1, 1890, p. 266, from *Wiener Med. Blätter, Jan. 23, 1890.*

Recently, Sir William Roberts has pointed out the fact that uric acid is maintained in solution by the salts in the blood and in the urine, and that the precipitation of uric acid in calculi, and presumably in the tissues of the body where it causes pain, rheumatism and neuralgia and other abnormal conditions, is due to a withdrawal of the salts *of the blood.*[†]

This bears upon the causation of pneumonia and other diseases of the lungs and air-passages, allied to influenza, also upon the causation of *rheumatism*, also allied, that being one of the diseases which increases a considerable time after the cold weather, and decreases soon after the warm weather. It also bears upon the subject of *neuralgia* (another allied disease) which increases and decreases under much the same conditions as does rheumatism. An excess of uric acid in the tissues[‡] has long been considered a cause of rheumatism, but the abnormal presence of the acid has not been satisfactorily accounted for, certainly not in any quantitative relation to the temperature of the atmosphere, while, as I have elsewhere shown, the disease has such a relation which is well marked. About how much rheumatism decreases during the warm season of the year, and increases during and especially after the cold season, is shown for Michigan by Diagram 1 herewith. Page clxiii.

Another link in the chain which binds rheumatism with diseases of the throat and air-passages, and with the influence of atmospheric temperature, is *tonsillitis.* At the last meeting of the British Medical Association, August, 1889, this subject was dealt with in a way to throw much light upon it; three of the valuable papers being published in the British Med. Journal, Sept. 14, 1889.

From the history of this subject, it seems that the close relationship of throat disease and rheumatism has been known to the leaders in the profession from very early times; and not only that, but the fact of both troubles being caused by exposure to cold has also been known. Recently many have written upon the subject. "In his work on the *Throat and its Diseases*, [§] Mr. Lennox Browne strongly insisted upon the close connection of tonsillitis with rheumatism." Dr. Garrod, Assistant Physician, West London Hospital, says: "Many sufferers from rheumatic fever give histories of soreness of the throat at the very beginning of their illness".[¶] Also: "There are, however, no distinctive features by which a rheumatic sore throat can be recognized, for it assumes various forms, from the most trifling injection of the pharynx, with perhaps some swelling of the palate and uvula, to the severer varieties of follicular and parenchymatous tonsillitis".[¶] Also, "Dr. Kingston Fowler estimates that sore throat is present in no less than 80 per cent of all cases of rheumatic fever, and there can, I think, be no question that the proportion is a very large one".[¶] On the other hand, "Dr. Haig-Brown found that there was a suggestion of rheumatic origin in 76 out of 119 cases of tonsillitis occurring in school boys, or 63.9 per cent, and Dr. Green estimates that two-thirds of all cases of tonsillitis are of rheumatic origin."[¶] "Dr. Cheadle says: 'Tonsillitis may occur at any period of the rheumatic series, although it most often comes first, immediately preceding arthritis.' "[¶]

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[*] Deutsche Medicinische Wochenschrift, Nov. 28, 1889 (No. 48), p. 992.

[†] Page 186, Med. Age, Apr. 25, 1890. Quoted from *Med. Press and Circular.*

[‡] In *acute* rheumatism there is acidity of the blood, due, apparently, to lactic acid.

[§] First edition, 1878.

[¶] Archibald E. Garrod, M. A., M. D., M. R. C. P., in British Med. Jour., Sept. 14, 1889, pp. 584, 585.

This means, I think, that tonsillitis is usually a first result of the causes of rheumatism; it is a first step which, if continued in a certain direction, leads to rheumatism; that is, when the micro-organisms,* in sufficient numbers, enter the circulation and reach the joints and tissues involved in this disease, in a person susceptible to rheumatism, because of the accumulation of uric acid or allied substance in the body.

### *The Relationships of Rheumatism, Neuralgia, Tonsillitis, Influenza, and Diseases of the Lungs,—Cold-weather Diseases.*

A strong line of evidence has, for several years, been available to me, showing the relationships of diseases. I refer to the statistics of sickness, supplied to the office in which I work, by the leading physicians in Michigan. The diseases are found to change according to the conditions of the atmosphere. Everyone knows that we have bowel diseases in the Summer, and diseases of the air-passages in Winter, yet just the relations which the several diseases in each class bear to each other is not generally known. I present herewith a table (Exhibit 5) exhibiting the diseases caused in Michigan by the conditions existing in the Spring of 1890, in conjunction with preëxisting conditions. It is only for a single week, but I think it is suggestive of what diseases result from such conditions as favor the introduction into the body of micro-organisms which enter by way of the throat and air-passages.

EXHIBIT 5.—*Influenza and allied diseases in Michigan, March 15, 1890.*

| Diseases arranged in order of greatest area of prevalence, in Michigan during week ending March 15, 1890. | Per cent of observers who reported the disease present. |
|---|---|
| Influenza | 79 |
| Rheumatism | 77 |
| Bronchitis | 73 |
| Neuralgia | 71 |
| Tonsillitis | 62 |
| Consumption of lungs | 60 |
| Pneumonia | 48 |

I have proved beyond any question that all these "cold-weather diseases" follow closely, and, to a certain extent quantitatively, not only the atmospheric temperature but the atmospheric humidity,—that the relation is inverse,—these diseases all increase after the inhalation of dry air, and decrease after the inhalation of moist air.†

In view of the new light recently thrown on this subject, by the important contributions of Sir William Roberts and others, previously referred to, I wish again to mention the facts which seem to me to explain the reason why on the exposure to the inhalation of cold dry air, the chlorides and salts cease to appear in the urine and accumulate in the throat and air passages; and to suggest why it is that the uric acid* and the poisonous constituents (leucomains) of the urine, do the same to some extent, while that portion of the uric acid, etc., which does not go with the salts and thus irritates the throat and air-passages tends to be precipitated in the urine and in the tissues, thus tending toward rheumatism, neuralgic pains, etc. The principal fact is so common-place that it would seem that no person should have difficulty in grasping it, being no less than the familiar one that rapid evaporation of a fluid containing a comparatively non-volatile salt leaves that salt in the solution, and if the saline fluid be continually renewed and as continually evaporated the degree of salinity of the fluid is correspondingly and constantly increased, and the longer such rapid evaporation continues, the stronger becomes the saline fluid. This, I believe, is precisely what occurs in the air-passages when a person inhales air unusually dry, or unusually cold, because cold air does not and cannot contain vapor of water,† except in very small amount, so when it reaches the air-passages it is dry, and in being warmed by contact with the air-passages its capacity for vapor of water rapidly increases, therefore it rapidly abstracts moisture from the air-passages. (It is for this reason that air that is becoming colder always *appears* damp,—its moisture is being expelled from it.)

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* Probably the most ordinary species—such, for instance, as *Staphylococcus pyogenes*.

† "The causation of cold-weather diseases," Report, Mich. Bd. Health, 1887, p. 197; also "Relations of Certain Met. Conditions, etc., p. 143, Report Mich. Bd. Health, 1888.

Knowing, as we now do, that after exposure to the inhalation of cold, dry air (air which, compared with that recently inhaled, is cold and dry) there is correspondingly increased sickness from influenza, tonsillitis, bronchitis, pneumonia, neuralgia, rheumatism, pleurisy, etc., knowing that there is increase of the salts taken out of the blood through or into the air-passages early in the course of all or nearly all of these diseases,† that (in some of them at least) they are taken out to such an extent that the chlorides are absent from the urine, and less than normal in the blood, knowing that it is these salts which normally keep the uric acid from precipitating, and that in rheumatism it does precipitate, it seems to me that one important phase of the causation of this whole class of "cold-weather diseases" is tolerably evident, and that the first link in the chain of their causation is the unusual evaporation of the saline fluid which normally moistens the air-passages.

So far as they are non-inflammatory, their causation can, I think, be fully explained on the lines here suggested, and which I have previously treated at such length that I will not take more time with it here.

### *Inflammation is Generally Due to Micro-organisms.*

But there is another very important phase of the causation of all inflammations; and it will be observed that nearly all of these diseases have, sometimes at least, the characters of an inflammation.

Although the graphic statement "without bacteria no inflammation" is now questioned, as to its being true as a precise scientific proposition, because inflammations have been caused experimentally in which no bacterium or spore of a bacterium was found, yet the fact remains that aseptic surgery has proved that the proposition is practically true. That the exclusion of septic micro-organisms, by cleanliness and care, has, in recent times, saved the lives of great numbers of persons who otherwise would have died, I have no doubt. Thanks to the labors of Metchnikoff, Nutall,[*] Buchner,[†] Nissen,[‡] Lubarsch,[§] Prudden,[||] and others, we now know that the normal blood-serum (and this is true of the gastric juice[¶] and some of the other fluids of the body) is capable of destroying a limited number of micro-organisms which in larger numbers are known to be deadly in their effects. And this may explain why cleanliness and the exclusion of *nearly* all "germs" is sometimes effective in preventing inflammation. Not only is the inflammation following wounds now generally attributed to septic micro-organisms, but nearly every one of the diseases allied to influenza, and influenza itself has been attributed to micro-organisms. Certainly micro-organisms are present in influenza, in bronchitis, pneumonia, tubercular phthisis, and in the inflamed joints in rheumatism. That micro-organisms sustain causal relations to these diseases I do not doubt. Although the evidence which I present proves that the actual rise and fall of these diseases is *controlled* by conditions of the atmosphere, yet there are phenomena associated with each of these diseases which are best accounted for by the facts which have been established relative to pathogenic micro-organisms. The proposition that, in order to be considered pathogenic of a given disease, the micro-organisms must be found only in that disease, it is now known should be modified, because there are diseases caused by micro-organisms which are present in a large proportion of persons in health:

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* ———,

† For facts as to preceding sore throat, etc., in rheumatism, see p. 584, British Med. Jour., Sept. 14, 1889.

Take for instance *staphylococcus pyogenes* which is known to cause boils, and osteo-myelitis, and is suspected of contributing to many diseases, and yet is present in the mouths of a considerable proportion of persons,[**] and although harmless under ordinary circumstances, is ready to increase and cause disease whenever unusual conditions favoring it occur.

Pneumonia has undoubtedly been produced in animals by their inoculation with micro-organisms not infrequently found in the human saliva.

Dr. Sternberg of the U. S. Army was probably the first to do this, in 1880–4 and since that time much has been learned. Pneumonia seems to have been caused, in man as well as in the lower animals, by more than one species of micro-organisms. Either that is true, or the micro-organisms assume different characters under different circumstances. Dr. Friedländer was, I think, the first to discover, in 1882, a micro-organism which has been found in some cases in the lungs of persons dead from pneumonia, but it is claimed that the micrococcus of Fränkel (*Micrococcus Pasteuri*—Sternberg) is found in a still greater proportion of cases.

Dr. Miller[††] says:—"If the micrococcus of sputum septicæmia is a frequent inhabitant of the mouths of sound men, so is its presence in pneumonia nearly constant. In genuine croupous pneumonia Fränkel has found it twelve times in fourteen cases, and Weichselbaum 81 times in 88 cases."

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[*] Nutall: Experimente über die bakterienfeindlichen Einflüsse des thierischen Körpers. Zeitschrift für Hygiene, Bd. iv., p. 353.

[†] Buchner: Über die bakterientödtende Wirkung des sellenfreien Blutserums. Centralblatt für Bakteriologie, etc., Bd. v., No. 25; Bd. vi., N.

[‡] Nissen: Zur Kentniss der bakterienvernichtenden Eigenschaft des Blutes. Zeits. f. Hygiene, Bd. vi., p. 457.

[§] Lubarsch: Über die bakterienvernichtenden Eigenschaften des Blutes, etc. Centralblatt. f. Bakteriologie, etc., Bd. vi., Nos. 18, 19, 20.

[||] T Mitchell Prudden, M. D., in Medical Record, Jan. 25, 1890, to whom I am indebted for the four preceding references.—H. B. B.

[¶] Eighteenth Annual Report, Local Gov. Bd. England, 1888-9, supplement containing the Med. Officer's Report, 1888, pp. 517, 521, 524.

[**] An account of results of experiments on this point is printed in this article, page clxx.

[††] "*Micro-organism der Mundhöhle.*"—Miller, pp. 207-208. See also Crookshank, "Manual of Bakteriology," second edition, p. 236, under "Bacterium septicum sputigenum."

Not long since Dr. Vito Platania, in Italy, published[*] an account of researches on the pneumococcus of Friedländer, made with a view to confirming the proposition that the introduction of a virus into an organism is not in itself sufficient to cause the disease. He considered that "Although it is certain that, every time the microbe of Friedländer has been inoculated into the lungs through the thoracic walls pneumonia has, in animals, regularly been reproduced, it should nevertheless be borne in mind that this manner of experimenting is different from that which takes place naturally in man, who, in all probability receives the specific infecting germ by way of the respiration".[†]

Dr. Platania found that simple inoculation in the trachea of guinea-pigs with a pure culture of the pneumococcus, without any other injury, did not, as a rule, cause pneumonia; although by coincident mechanical injury, or by causing the inhalation of irritant gases, pneumonia was produced. He caused guinea-pigs to breathe air heated to 60°, and immediately afterwards, air a few degrees below zero. "The definite results of the experiments were, that of the eleven guinea-pigs inoculated by the trachea and subjected to the chilling process, eight times, the result was positive, and three times, negative. If we compare this result with that of the simple tracheal inoculation where out of ten cases there were nine negative, we must arrive at the conclusion that really the influence of the chilling manifests itself, in the experimental field, as a condition which disposes the organism to cultivate in the lungs the pneumococcus of Friedländer.[‡]

Dr. Platania caused the animals to inhale, with the cold air, dust infected with the pneumococcus. "Of eight cases there were three positive and five negative". Animals subjected to the chilling without supplying the micro-organisms had hyperæmia but not inflammation.

The results of these experiments are in entire harmony with what we knew before; because many experimenters have proved that the injection of micro-organisms into the lungs, in conjunction with injury, generally causes pneumonia in animals; many observers have found these micro-organisms in the lungs of persons dead from pneumonia; many times pneumonia has been caused in animals by injecting into their lungs the saliva of healthy persons;[§] these micro-organisms have been found in the saliva, and in the bodies of animals dead from injections of the saliva. According to a recent writer[¶] "The pneumococcus exists in the mouth of the healthy individual in at least 20 cases out of 100."[||] Statistics collected by myself prove that pneumonia occurs most after the atmosphere (to which all are more or less exposed) has been cold, and that the disease does not so often occur after the atmosphere has been warm; that in fact exposure to cold atmosphere is a "controlling cause" of the disease, or if that term is objected to, it may be called the controlling condition. My belief is that the controlling condition of pneumonia, is exposure to the inhalation of cold air, and that in some localities, probably 20 per cent of the people generally have in their mouths, throats, noses, or air-passages, the micro-organisms which, through conditions brought about by exposure to the inhalation of cold air, are liable to cause pneumonia, in persons predisposed to that disease.

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[*] *Giornale intern. delle scienze mediche, fascicule V.*

[†] *Bulletin Général* de *Thérapeutique*, Paris, France, 15 *Decembre*, 1889, p. 520.

[‡] *Bulletin Général* de *Thérapeutique*, 15 *Decembre*, 1889, p. 522.

[§] Boston Med. and Surg. Jour., Jan. 23, 1890. (Ther. Gazette, Feb. 15, 1890, pp. 141-2.)

[¶] *La Rivista Internazionale d'Igiene*, April, 1890.

[||] Abstract of Sanitary Reports U. S. Marine Hospital Service, May 9, 1890, p. 208.

The foregoing review of what we know about pneumonia, suggests what may be true in influenza, namely that influenza is due to micro-organisms which are generally present in the noses or upper air-passages of a considerable proportion of the people, and which are enabled to reproduce in unusual numbers, and by the poison which they excrete to cause influenza whenever through the inhalation of cold air the upper air-passages are irritated, or through nervous influence due to the impress of cold or wind on the surface of the body, there is such a flow of saline fluid to the upper air-passages as shall supply conditions favorable for their rapid multiplication; or, what is yet more likely, whenever, through the inhalation of an atmosphere which is unusually drying in its effects on the nasal secretions, the power of the normal nasal mucus to protect against the entrance of pathogenic micro-organisms is abrogated, and the germs then enter, whereas under usual conditions they are confined to the lower inch of the nasal cavities.

## *Influenza in Animals and in Man.*

In some epidemics of influenza horses and other of the lower animals are attacked, and as a rule mankind is exempt; in some epidemics both lower animals and man are attacked; and in some epidemics mankind suffers and the lower animals are exempt. This seems to indicate that the prevailing germ or specific cause may not be the same in all epidemics. Some micro-organisms are pathogenic to some animals and not to others.*

Speaking of epidemic influenza, a writer in the British Medical Journal, says:—

"As a rule it has been preceded by a similar malady among horses: for instance in 1688 the cavalry horses encamped at the Curragh were affected several weeks before the influenza or 'short fever' appeared among the troops and civil population. In 1732–3 the horses were universally attacked with a running of the nose and cough. In 1743 the epidemic spread first amongst the deer; then the horses were affected—many died. In 1775 horses and dogs were affected in August and September; but the epidemic did not attack men till October.

"The present epidemic among horses has now lasted for at least six weeks, and has spread largely in London, affecting mainly the large stables, one firm of carriers having 100 horses affected at the same time. Horses in small stables generally escape, whilst those in large ones suffer most severely.

"As the horses are already affected it behooves us to prepare by adopting every invigorating means in our power to withstand the evil when it attacks ourselves."†

*The symptoms of Influenza in different persons differ; and they should differ, as do the pathogenic micro-organisms which may enter the body by reason of influenza.*

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* Mikro-organismen der Mundhöhle.—Miller. pp. 204.

† British Medical Journal, Dec 14, 1889, p. 1363.

Several different pathogenic micro-organisms are known to be present in the mouths of a proportion of all persons, both sick and well. Among these are the micrococcus of sputum septicæmia (known to cause pneumonia) the *bacillus crassus sputigenus* (Kreibohm)*, *Staphylococcus pyogenes aureus,* and *albus, Streptococcus pyogenes, Micrococcus tetragenus, bacillus salivarius septicus, Coccus salivarius septicus,* etc.

Given entrance to the body, these micro-organisms differ somewhat in their effect, and also as to the part of the body which they affect; thus Kreibohm, in the Gottingen Hygienic Institute, found in human sputum two kinds of pathogenic bacteria, one of which kind was found in great numbers in the lungs of animals that died from inoculation therewith, while the other bacterium was not found in the lungs in greater number than in the other organs of the body.† Biondi (Breslauer arzliche Zeitschr, Sept. 1887, No. 18) found one—the *bacillus salivarius septicus* which, although it had no special predilection for any organ, yet caused enlargement of the spleen, œdema, and hemorrhages.‡ Kreibohm found twice in sputum a *bacillus crassus sputigenus* which, in animals (rabbits and dogs) caused diarrhea, bloody stools, death within three to ten hours, and *post mortem* appearances of gastro-enteritis.§

However, Biondi found two different diseases produced in animals by the inoculation of the same micro-organism—*Streptococcus septo-pyæmicus.*¶

SUMMARY OF CONCLUSIONS.

1. Epidemic Influenza is the same disease as ordinary influenza; as is proved by facts observed and recorded by a large number of physicians in Michigan.

2. Influenza is, to a very great degree, controlled by known atmospheric conditions, chiefly the temperature and the humidity of the atmosphere, but wind has much influence, and probably also ozone, fog and dust have influence.

3. Great epidemics of influenza have generally followed or coincided with meteorological conditions which were very unusual. The recent epidemic has, in some parts of the world, followed, and preceding epidemics have followed, or been attended with, great extremes of temperature, high winds, winds from unusual directions, etc., dust, drouth, fogs, some of these conditions tending to increased numbers of micro-organisms in the atmosphere, and all tending either to evaporation of the fluids of the air-passages, or otherwise toward irritating the air-passages.

4. Briefly, the atmospheric conditions tending most strongly to cause influenza, are a high temperature followed rapidly by a low temperature, or by a wind which has the effect of rapidly cooling and drying everything exposed to the atmosphere, including the air-passages of man. There is some evidence tending to show that when, after extreme cold, or after a drying wind the atmosphere suddenly becomes warm, the drying influence on the air-passages of man, or at least the influence which

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* Page 208, Micro-organismen der Mundhöle, Miller.

† Pages 204–5 and 212, Micro-organismen der Mundhöle, Miller.

‡ Page 212, Micro-organismen der Mundhöle, Miller.

§ Page 209, Micro-organismen der Mundhöle, Miller.

¶ Pages 212-213, Micro-organismen der Mundhöle, Miller.

causes influenza is still further increased. Thus in the great epidemic in St. Petersburg in 1782, the atmospheric temperature suddenly rose 92°, *from* a temperature of 47° below zero.* By such extreme cold, practically all moisture was certainly expelled from the atmosphere; by the sudden rise of temperature the capacity of the atmosphere for vapor of water was suddenly greatly increased, so that moisture must have been rapidly abstracted from every moist surface including the air-passages of every person, except the few persons who, like cooks and laundresses, chanced to be protected by surrounding vapor of water.

5. Abnormal evaporation of the mucus in the nose destroys one of the most important factors for the prevention of the entrance of the germs of diseases. This is probably one of the most important factors to be considered in the causation of influenza and of all of the communicable diseases which enter with the air inhaled.

6. Unusual evaporation of the normal fluids of the air-passages leaves the chlorides and other non-volatile constituents in excess at the place of evaporation, and sometimes this goes so far as to reduce below the normal the salts in the blood and urine, and this tends toward the precipitation of uric acid, and, consequently, toward neuralgia and rheumatism.

7. So far as influenza is an inflammatory disease, it is probably dependant upon micro-organisms, and upon those which are among the most wide-spread and common of all that affect the human organism; and they are not necessarily always of one species; and it is probable that the several varieties of the ordinary *Staphylococcus* and *Streptococcus pyogenes* are active agents in influenza, and in other diseases which enter the body by way of the air-passages. (They are known to be present in influenza,† bronchitis,† pneumonia,† and in osteo-myelitis.)†

8. Influenza, or the "influence" which leads to it, supplies a way for the entrance to the body of micro-organisms which like *Staphylococcus pyogenes* may cause one disease or another, or no serious trouble, according to conditions which, for instance, like a co-existing injury to bone, may determine the occurrence of osteo-myelitis, or under other conditions, boils or carbuncles, or herpes.‡ Erysipelas and cerebro-spinal meningitis have not infrequently, and pneumonia has still more frequently followed influenza,—the entrance of the micro-organisms which cause these diseases being facilitated by the same "influences" which cause influenza; but it is quite possible that in some instances what is known as the "influenza" itself has been the effects of the local action, in the upper air-passages and elsewhere in the body, of one or more species of the micro-organisms which are believed to be the specific causes of the above-named diseases. Diagram 3, page clxv, shows that influenza and pneumonia are almost identical in some particulars. If due to different specific micro-organisms they must be very closely related species.

9. Through similarity of causation, and probably by contributing to their causation, influenza is allied to several important diseases, and, during an epidemic of it, the mortality is chiefly from those other diseases.

10. Although influenza seems to be communicable, yet the onset of the disease usually affects so large a proportion of the people of a place, of the people of a country, and sometimes of widely separated countries, as to make it improbable that the disease occurs only by spreading *directly*

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* Sanitary Record, April 15, 1890, p. 498. † Pages clix–clxxi of this article.

‡ *Staphylococcus pyogenes* has been found in herpes labialis, and cultivated therefrom.

from person to person. In the absence of disinfection the germs must persist for a long time, and be very widely disseminated. The occurrence of the disease in a similar manner on vessels at sea is also evidence in the same direction.

11. The fact that so large a proportion of the people of a city or a country come down with influenza at the same time* has led to the belief which seems quite possibly true that the germ of the disease has sometimes been carried in the air by the wind. But this fact is as satisfactorily explained by supposing that the unusual "east wind" or other atmospheric condition to which the people have been exposed has rendered it possible for a "germ" or micro-organism ordinarily present in the noses or mouths of persons to enter the air-passages and to multiply rapidly so that the poison and perhaps also the "germ" gains entrance to the general circulation of the persons primarily infected, and the germs spread to other persons in the same immediate vicinity.

12. The micro-organisms which, thus far, have been found to bear a somewhat constant relation to influenza, bronchitis, and pneumonia, have also been found in the mouths and noses of a considerable proportion of people in health.

13. All of these facts are in harmony with the view that, through the influence of the unusual atmospheric conditions, a micro-organism which is quite generally present in the air-passages, or more likely in the mouth or lower portion of the nose of man is able to gain further entrance, and to multiply to an unusual extent, and to affect injuriously the person in whose air-passages they are, and to be spread about the community to an extent, and in numbers greater than is common.

14. If the foregoing is the true explanation, then there should be, under *ordinary* conditions of the atmosphere, occasional slight changes which should be sufficient to cause influenza in a few susceptible persons. It is a fact that influenza thus occurs in Michigan in every month of every year. It is also a fact that it sustains well-marked relations to certain conditions of the atmosphere. It is also a fact that when influenza becomes epidemic those same atmospheric conditions which have apparent causal relations to non-epidemic influenza, have similar apparent causal relations to epidemic influenza. (This is shown by Diagrams 3, p. clxv, and 10, p. cxcvi.)

## TABLES, ETC.

TABLE 5.—*Exhibiting, by Months, the Average Daily Velocity of the Wind† for a period of 16 Years, 1872-87, at Denver, Colorado; also the Deaths from Consumption.‡*

| Months. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Daily average velocity of the wind, 16 years, 1872-87, at Denver, Colo.† | 165.8 | 160.9 | 178.0 | 180.2 | 165.5 | 159.4 | 150.6 | 139.2 | 138.1 | 147.1 | 154.1 | 151.6 |
| Deaths from consumption‡. | 44.52 | 41.33 | 85.81 | 41.00 | 40.65 | 20.00 | 25.16 | 32.90 | 31.00 | 39.68 | 42.00 | 41.61 |

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* For instance, in 1847 the entire universe was struck in a few months. In 1850 all Spain was affected with the influenza on the same day."—Paris Corres. Am. Practitioner, Feb. 15, 1890, p. 109.

† The data for velocity of the wind were supplied by Sergeant J. J. Gilligan, United States Signal Service, Denver, Colorado.

‡ In Colorado during the census year 1870, in Denver during 1889, in Colorado Springs and in Boulder for a long series of years. The months are here made of equal length—30 days.

The lines "Daily average velocity of the wind" and "Deaths from consumption" in this Table are graphically represented in Diagram 5, page clxxxvi.

TABLE 6.—*Average amount of Atmospheric Ozone (Night), by Months for the 14 Years, 1877–90, computed from reports of observations by Meteorological Observers for the State Board of Health, at several stations in Michigan.*

| Years. | Ozone by Night.—Degree of Coloration of Test-paper.* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 14 years, 1877–90† | 3.89 | 4.10 | 4.08 | 3.77 | 3.66 | 3.37 | 2.77 | 2.79 | 2.81 | 3.13 | 3.31 | 3.70 |

* In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.
† This average line is graphically represented in Diagram 8, page cxci.

TABLE 7.—*Relation of Atmospheric Temperature to Influenza in Michigan:—Exhibiting, by months, for the 13 years, 1877–89, the Average Atmospheric Temperature in degrees Fah., at several stations, and the average sickness from Influenza, stated in percentage of weekly reports.*

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Temperature* | 20.49 | 22.92 | 29.63 | 44.17 | 56.28 | 65.28 | 70.78 | 68.03 | 61.09 | 49.49 | 36.32 | 27.77 |
| Influenza* | 53 | 58 | 57 | 50 | 37 | 27 | 19 | 19 | 27 | 32 | 39 | 46 |

*The lines for temperature and influenza are graphically represented in Diagram 10, page cxcvi. The averages for every month in the year for each of the 13 years are shown in Table 8, pages ccx and ccxi.

### *List of Diagrams which are not here reproduced, but which were made, studied, exhibited, and copies distributed to the audience when the paper was read.*

Diagram—Exhibiting for each and every month in each of the 12 years, 1877–88, the relation between *Sickness* in Michigan from *Influenza* and the *Average Atmospheric Temperature.* (Temperature curve reversed.)*

Diagram—Exhibiting by months, in each of the 10 years, 1879–88, the relation between *Sickness* in Michigan from *Influenza* and the *Average Daily Range* of *Atmospheric Temperature.*

Diagram—Exhibiting by months, in each of the 7 years, 1882–88, the relation between *Sickness* in Michigan from *Influenza* and the average daily *Range of Atmospheric Pressure.*

Diagram—Exhibiting by months in each of the 9 years, 1880–88, the relation of *Sickness* in Michigan from *Influenza* to the *Average Velocity of the Wind* in miles per hour. (From Registers of Robinson's self-registering anemometer.)†

Diagram—Exhibiting by months in each of the 12 years, 1877–88, the relation between *Sickness* in Michigan from *Influenza* and the average atmospheric *Ozone* (by observations day and night).‡

Diagram—Exhibiting by months in each of the 11 years, 1878–88, the relation between *Sickness* in Michigan from *Influenza* and the average *Relative Humidity.*

Diagram—Exhibiting for every month in each of the 12 years, 1877–88, the relation between *Sickness* in Michigan from *Influenza* and the average *Absolute Humidity.* (Humidity curves reversed.)§

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* A diagram (10), page cxcvi, exhibits the average relations for a series of years, but not for each of the years.
† A diagram, (7), page clxxxviii, exhibits the average relations for a series of years but not for each of the years.
‡ A diagram (8), page cxci, exhibits the average relations for a series of years, but not for each of the years.
§ A diagram (9), page cxcviii, exhibits the average relations for a series of years, but not for each of the years.

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TABLE 8.—*Exhibiting, for each month in the year for each of the 14 years, 1877–90, the average percentage of weekly reports of sickness from Influenza in Michigan; also monthly averages for several series of years; also, for comparison, exhibiting, for each month in each year in corresponding series of years, the average Atmospheric Temperature; the average Daily Range of Atmospheric Temperature; the average Daily Range of Atmospheric Pressure; the average Velocity of the Wind; the average Atmospheric Ozone; the average Relative Humidity and the average Absolute Humidity, all computed from reports of observations by meteorological observers for the State Board of Health at several stations in Michigan.*

| Years. | Average per cent of Reports of sickness from Influenza. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| 1877 | 56 | 65 | 60 | 50 | 33 | 27 | 26 | 15 | 25 | 34 | 48 | 49 |
| 1878 | 49 | 52 | 52 | 54 | 46 | 37 | 27 | 24 | 38 | 41 | 50 | 57 |
| 1879 | 70 | 81 | 76 | 66 | 41 | 29 | 23 | 23 | 33 | 30 | 38 | 51 |
| 1880 | 65 | 69 | 60 | 45 | 34 | 23 | 14 | 31 | 28 | 33 | 48 | 52 |
| 1881 | 57 | 64 | 59 | 52 | 30 | 19 | 9 | 16 | 17 | 18 | 34 | 42 |
| 1882 | 48 | 51 | 52 | 47 | 40 | 33 | 21 | 19 | 33 | 40 | 44 | 52 |
| 1883 | 51 | 62 | 71 | 60 | 50 | 33 | 24 | 21 | 26 | 35 | 39 | 47 |
| 1884 | 55 | 51 | 50 | 49 | 42 | 30 | 27 | 30 | 34 | 37 | 42 | 49 |
| 1885 | 58 | 60 | 52 | 41 | 31 | 23 | 18 | 18 | 30 | 31 | 37 | 40 |
| 1886 | 44 | 51 | 62 | 54 | 35 | 26 | 14 | 10 | 21 | 27 | 36 | 42 |
| 1887 | 47 | 52 | 50 | 43 | 34 | 23 | 13 | 18 | 27 | 28 | 35 | 38 |
| 1888 | 43 | 56 | 53 | 41 | 32 | 24 | 13 | 12 | 19 | 28 | 31 | 40 |
| 1889 | 42 | 44 | 48 | 50 | 34 | 22 | 16 | 16 | 21 | 33 | 30 | 37 |
| 1890 | 92 | 95 | 73 | 53 | 44 | 30 | 24 | 25 | 41 | 49 | 56 | 69 |
| Av. 14 years, 1877–90* | 56 | 61 | 58 | 50 | 38 | 27 | 19 | 20 | 28 | 33 | 40 | 48 |
| Av. 13 years, 1877–89† | 53 | 58 | 57 | 50 | 37 | 27 | 19 | 19 | 27 | 32 | 39 | 46 |
| Av. 10 years, 1880–89‡ | 51 | 56 | 56 | 48 | 36 | 26 | 17 | 19 | 26 | 31 | 38 | 44 |

* This line is graphically represented in Diagram 8, page cxci.
† This line is graphically represented in Diagram 9, page cxcviii, and in Diagram 10, page cxcvi.
‡ This line is graphically represented in Diagram 7, page clxxxviii.

TABLE 8.—CONTINUED.—*Atmospheric Temperature in Michigan, Series of Years by Months.*

| Years. | Average Atmospheric Temperature—Degrees Fah. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| 1877 | 19.18 | 32.27 | 25.92 | 46.71 | 58.24 | 67.48 | 72.80 | 70.52 | 63.80 | 52.78 | 37.57 | 36.73 |
| 1878 | 27.17 | 29.75 | 41.46 | 52.27 | 54.73 | 65.18 | 74.22 | 70.92 | 63.99 | 50.13 | 38.34 | 22.74 |
| 1879 | 20.86 | 20.69 | 33.08 | 44.29 | 58.03 | 64.70 | 73.16 | 68.99 | 57.48 | 57.43 | 36.80 | 26.41 |
| 1880 | 34.06 | 27.93 | 31.00 | 44.39 | 62.27 | 67.41 | 69.39 | 68.07 | 59.54 | 46.69 | 27.24 | 20.67 |
| 1881 | 14.93 | 19.75 | 29.36 | 40.53 | 62.72 | 63.32 | 72.95 | 71.76 | 67.99 | 51.87 | 37.42 | 34.03 |
| 1882 | 24.32 | 33.42 | 34.12 | 42.65 | 51.04 | 64.43 | 67.84 | 69.05 | 61.70 | 53.53 | 37.90 | 25.72 |
| 1883 | 15.78 | 20.03 | 24.63 | 43.00 | 51.37 | 64.73 | 68.36 | 65.41 | 57.24 | 46.73 | 38.10 | 26.89 |
| 1884 | 15.14 | 20.94 | 28.78 | 42.00 | 54.38 | 67.04 | 66.70 | 66.10 | 64.72 | 51.56 | 34.53 | 24.77 |
| 1885 | 15.46 | 10.20 | 19.51 | 41.39 | 53.82 | 63.39 | 71.13 | 63.23 | 59.14 | 45.78 | 38.14 | 27.59 |
| 1886 | 18.72 | 21.18 | 30.10 | 46.04 | 54.69 | 63.31 | 68.68 | 67.36 | 61.15 | 51.84 | 34.32 | 20.44 |
| 1887 | 16.58 | 21.57 | 25.55 | 42.09 | 60.68 | 66.53 | 73.22 | 66.41 | 57.95 | 44.46 | 35.18 | 27.57 |
| 1888 | 15.93 | 21.65 | 25.89 | 42.81 | 53.40 | 68.03 | 70.95 | 68.05 | 58.20 | 46.01 | 38.73 | 30.73 |
| 1889 | 28.18 | 18.57 | 35.83 | 46.04 | 56.74 | 63.05 | 70.69 | 68.58 | 61.36 | 44.59 | 37.95 | 36.76 |
| Av. 13 years, 1877-89* | 20.49 | 22.92 | 29.63 | 44.17 | 56.28 | 65.28 | 70.78 | 68.03 | 61.09 | 49.49 | 36.32 | 27.77 |

* This line is graphically represented in Diagram 10, page cxcvi.

TABLE 8.—CONTINUED.—*Average Daily Range of Atmospheric Temperature—Degrees Fah. in Michigan.*

| Years. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1879 | 17.12 | 17.64 | 16.95 | 21.43 | 23.58 | 21.87 | 20.92 | 22.21 | 19.06 | 18.61 | 16.00 | 15.23 |
| 1880 | 15.55 | 17.47 | 17.46 | 18.15 | 20.86 | 18.61 | 18.50 | 17.97 | 17.69 | 16.37 | 14.52 | 11.26 |
| 1881 | 16.30 | 17.68 | 14.37 | 19.43 | 21.38 | 18.37 | 19.40 | 19.62 | 17.76 | 16.22 | 14.17 | 11.41 |
| 1882 | 15.70 | 16.52 | 15.89 | 19.08 | 19.55 | 20.33 | 20.25 | 16.80 | 19.31 | 19.77 | 13.51 | 12.43 |
| 1883 | 17.64 | 18.38 | 21.44 | 19.64 | 20.21 | 19.13 | 19.06 | 22.65 | 23.95 | 15.70 | 16.34 | 15.44 |
| 1884 | 17.72 | 17.79 | 19.88 | 19.22 | 19.50 | 21.90 | 20.83 | 21.27 | 20.87 | 18.69 | 16.37 | 14.09 |
| 1885 | 17.03 | 22.94 | 22.22 | 18.25 | 19.72 | 22.73 | 22.09 | 18.45 | 20.42 | 16.81 | 11.53 | 13.19 |
| 1886 | 13.65 | 17.40 | 15.93 | 20.11 | 21.87 | 22.02 | 22.94 | 19.77 | 18.83 | 19.31 | 15.11 | 15.44 |
| 1887 | 17.96 | 17.06 | 18.02 | 19.52 | 22.52 | 20.68 | 21.91 | 20.81 | 19.79 | 16.50 | 14.80 | 11.88 |
| 1888 | 15.28 | 17.70 | 17.73 | 18.70 | 18.04 | 21.11 | 20.68 | 20.21 | 20.33 | 14.58 | 13.47 | 11.28 |
| Av. 10 years, 1879-88 | 16.40 | 18.06 | 17.99 | 19.35 | 20.72 | 20.68 | 20.66 | 19.98 | 19.80 | 17.26 | 14.58 | 13.17 |

TABLE 8.—CONTINUED.—*Daily Range, Atmospheric Pressure, Series of Years, by Months, in Michigan.*

| Years. | Average Daily Range of Atmospheric Pressure. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| 1882 | .338 | .330 | .362 | .192 | .158 | .163 | .123 | .095 | .148 | .200 | .189 | .225 |
| 1883 | .335 | .338 | .285 | .180 | .200 | .157 | .130 | .129 | .198 | .226 | .309 | .266 |
| 1884 | .307 | .288 | .277 | .205 | .177 | .116 | .127 | .154 | .108 | .208 | .232 | .281 |
| 1885 | .319 | .217 | .267 | .253 | .148 | .165 | .118 | .165 | .173 | .182 | .181 | .314 |
| 1886 | .270 | .324 | .248 | .166 | .157 | .131 | .112 | .142 | .187 | .229 | .269 | .220 |
| 1887 | .344 | .417 | .254 | .228 | .123 | .118 | .113 | .111 | .176 | .219 | .257 | .250 |
| 1888 | .332 | .302 | .228 | .240 | .172 | .137 | .105 | .137 | .189 | .217 | .206 | .223 |
| Av. 7 years, 1882–88 | .321 | .317 | .274 | .209 | .162 | .141 | .118 | .133 | .168 | .211 | .249 | .254 |

TABLE 8.—CONTINUED.—*Average Velocity of the Wind.*—Miles per Hour, in Michigan.*

| Years. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1880 | 11.0 | 12.6 | 12.8 | 13.8 | 10.4 | 8.3 | 6.5 | 5.9 | 8.1 | 7.8 | 8.6 | 7.4 |
| 1881 | 7.3 | 11.0 | 10.4 | 9.8 | 8.4 | 8.4 | 8.1 | 7.0 | 10.3 | 8.7 | 14.6 | 11.2 |
| 1882 | 11.5 | 11.7 | 11.8 | 11.1 | 10.1 | 8.7 | 8.5 | 6.9 | 7.5 | 8.6 | 8.6 | 10.1 |
| 1883 | 10.9 | 10.9 | 10.3 | 9.9 | 10.7 | 8.8 | 8.7 | 7.9 | 8.3 | 9.3 | 12.6 | 10.8 |
| 1884 | 11.1 | 9.2 | 8.8 | 10.1 | 9.4 | 6.8 | 7.9 | 7.9 | 9.0 | 10.5 | 10.8 | 10.8 |
| 1885 | 11.8 | 9.0 | 10.2 | 10.0 | 9.0 | 8.7 | 7.6 | 8.1 | 8.8 | 8.2 | 9.9 | 11.5 |
| 1886 | 10.5 | 11.2 | 10.1 | 8.7 | 8.4 | 7.3 | 7.0 | 7.4 | 9.0 | 8.8 | 12.0 | 10.3 |
| 1887 | 11.6 | 11.1 | 9.9 | 10.7 | 7.4 | 6.9 | 7.8 | 7.0 | 8.4 | 11.5 | 11.6 | 11.0 |
| 1888 | 10.2 | 10.1 | 11.4 | 10.6 | 9.1 | 8.6 | 7.3 | 8.6 | 8.8 | 10.1 | 10.2 | 12.0 |
| 1889 | 10.2 | 10.7 | 9.4 | 9.5 | 9.9 | 7.5 | 6.9 | 7.7 | 9.1 | 8.8 | 9.7 | 11.0 |
| Av. 10 years, 1880–89† | 10.6 | 10.8 | 10.5 | 10.4 | 9.3 | 8.0 | 7.6 | 7.4 | 8.7 | 9.2 | 10.8 | 19.6 |

* For velocity of the wind, one station only, is represented for 1880 and 1881; for the remaining years from 7 to 9 stations are represented.

† This line is graphically represented in Diagram 7, page clxxxviii.

TABLE 8.—CONTINUED.—*Atmospheric Ozone in Michigan, Series of Years, by Months.*

| Years. | Atmospheric Ozone.—Day and Night Observations. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| 1877 | 2.93 | 1.90 | 2.85 | 1.83 | 1.59 | 2.06 | 1.77 | 2.09 | 2.05 | 2.41 | 2.95 | 2.69 |
| 1878 | 3.97 | 4.31 | 4.34 | 3.71 | 3.58 | 3.00 | 2.59 | 2.50 | 2.67 | 3.17 | 3.29 | 3.75 |
| 1879 | 3.80 | 3.88 | 3.82 | 3.27 | 2.84 | 2.25 | 2.10 | 1.95 | 2.37 | 2.42 | 3.01 | 3.07 |
| 1880 | 3.19 | 4.22 | 4.19 | 4.10 | 3.61 | 3.30 | 2.96 | 2.70 | 2.33 | 2.71 | 3.53 | 3.82 |
| 1881 | 3.89 | 4.32 | 4.38 | 3.91 | 3.41 | 3.55 | 3.14 | 3.15 | 3.23 | 3.06 | 3.72 | 3.40 |
| 1882 | 3.92 | 3.98 | 4.18 | 3.92 | 3.89 | 3.41 | 2.81 | 2.42 | 2.64 | 2.93 | 3.05 | 3.80 |
| 1883 | 4.22 | 4.28 | 3.68 | 3.48 | 3.56 | 3.09 | 2.86 | 2.52 | 2.68 | 3.08 | 3.10 | 3.50 |
| 1884 | 3.70 | 3.83 | 3.88 | 3.13 | 3.23 | 2.81 | 2.71 | 2.76 | 2.49 | 2.67 | 2.74 | 2.98 |
| 1885 | 3.32 | 3.49 | 3.67 | 3.60 | 3.33 | 2.92 | 2.75 | 3.25 | 2.94 | 3.24 | 3.14 | 3.22 |
| 1886 | 3.39 | 3.42 | 3.27 | 3.09 | 3.10 | 3.10 | 2.71 | 3.17 | 3.21 | 3.35 | 3.46 | 3.58 |
| 1887 | 3.51 | 3.76 | 3.55 | 3.46 | 3.28 | 3.13 | 2.90 | 3.04 | 3.16 | 3.35 | 3.24 | 3.52 |
| 1888 | 3.69 | 3.81 | 4.15 | 4.87 | 5.55 | 5.08 | 3.10 | 3.75 | 4.24 | 4.32 | 3.61 | 4.81 |
| Av. 12 years, 1877-88 | 3.63 | 3.77 | 3.79 | 3.53 | 3.41 | 3.14 | 2.70 | 2.78 | 2.83 | 3.06 | 3.24 | 3.51 |

TABLE 8.—CONTINUED.—*Average Relative Humidity—Per cent of Saturation, by Months, in Michigan.*

| Years. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1878 | 83 | 80 | 79 | 71 | 69 | 71 | 76 | 74 | 76 | 75 | 79 | 86 |
| 1879 | 82 | 80 | 75 | 66 | 63 | 70 | 70 | 70 | 76 | 74 | 80 | 83 |
| 1880 | 79 | 75 | 70 | 67 | 65 | 70 | 74 | 75 | 74 | 75 | 77 | 81 |
| 1881 | 79 | 81 | 79 | 68 | 67 | 72 | 69 | 69 | 74 | 80 | 79 | 80 |
| 1882 | 81 | 77 | 77 | 68 | 67 | 71 | 70 | 81 | 77 | 76 | 79 | 82 |
| 1883 | 82 | 81 | 75 | 67 | 70 | 77 | 76 | 71 | 75 | 76 | 76 | 80 |
| 1884 | 80 | 82 | 77 | 67 | 70 | 73 | 71 | 73 | 73 | 75 | 79 | 83 |
| 1885 | 80 | 80 | 77 | 72 | 69 | 70 | 71 | 78 | 75 | 79 | 82 | 82 |
| 1886 | 85 | 82 | 80 | 76 | 72 | 72 | 71 | 75 | 78 | 75 | 76 | 82 |
| 1887 | 77 | 85 | 79 | 74 | 70 | 75 | 70 | 71 | 75 | 76 | 78 | 86 |
| 1888 | 90 | 87 | 84 | 69 | 71 | 70 | 71 | 72 | 74 | 76 | 79 | 83 |
| Av. 11 years, 1878-88 | 82 | 81 | 77 | 70 | 68 | 72 | 72 | 74 | 75 | 76 | 79 | 83 |

TABLE 8.—CONTINUED.—*Atmospheric Humidity in Michigan, Series of Years, by Months.*

| Years. | Average Absolute Humidity—Grains of Vapor in a Cubic Foot of Air. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| 1877 | 1.37 | 1.87 | 1.61 | 2.53 | 4.10 | 5.67 | 6.33 | 6.24 | 5.37 | 4.08 | 2.46 | 2.61 |
| 1878 | 1.73 | 1.83 | 2.79 | 3.68 | 3.88 | 5.26 | 7.14 | 6.37 | 5.44 | 3.62 | 2.47 | 1.54 |
| 1879 | 1.31 | 1.23 | 1.93 | 2.64 | 3.94 | 5.09 | 6.30 | 5.58 | 4.40 | 4.61 | 2.46 | 1.70 |
| 1880 | 2.13 | 1.68 | 1.70 | 2.69 | 4.56 | 5.57 | 6.09 | 5.97 | 4.74 | 3.18 | 1.70 | 1.32 |
| 1881 | 1.02 | 1.38 | 1.73 | 2.41 | 4.66 | 4.98 | 6.23 | 5.97 | 5.73 | 3.93 | 2.38 | 2.10 |
| 1882 | 1.53 | 2.08 | 2.06 | 2.59 | 3.30 | 5.20 | 5.52 | 6.47 | 5.03 | 3.95 | 2.46 | 1.59 |
| 1883 | 1.11 | 1.29 | 1.39 | 2.55 | 3.44 | 5.45 | 6.02 | 5.20 | 4.31 | 3.22 | 2.43 | 1.66 |
| 1884 | 1.09 | 1.37 | 1.77 | 2.42 | 3.78 | 5.59 | 5.40 | 5.52 | 5.24 | 3.72 | 2.11 | 1.69 |
| 1885 | 1.14 | 0.94 | 1.25 | 2.53 | 3.62 | 4.90 | 6.12 | 5.29 | 4.56 | 3.17 | 2.50 | 1.72 |
| 1886 | 1.32 | 1.48 | 1.82 | 3.11 | 3.82 | 4.98 | 5.59 | 5.75 | 4.94 | 3.64 | 2.02 | 1.36 |
| 1887 | 1.25 | 1.45 | 1.49 | 2.63 | 4.43 | 5.50 | 6.29 | 5.22 | 4.37 | 2.98 | 2.16 | 1.77 |
| 1888 | 1.25 | 1.51 | 1.67 | 2.55 | 3.69 | 5.71 | 5.95 | 5.59 | 4.30 | 3.05 | 2.49 | 1.92 |
| 1889 | 1.77 | 1.34 | 2.13 | 2.88 | 3.95 | 5.33 | 6.19 | 5.52 | 4.82 | 2.76 | 2.52 | 2.48 |
| Av. 13 years, 1877–89 * | 1.39 | 1.49 | 1.80 | 2.73 | 3.94 | 5.33 | 6.09 | 5.75 | 4.87 | 3.53 | 2.32 | 1.80 |

* This line is graphically represented in Diagram 9, page cxcviii.

NOTE.—For the plan for Table I, page clxxiv, and for some of the data for it, I am indebted to "*Veröffentlichungen des Kaiserlichen Gesundheitsamtes.*"—Jan., 1890.

[PART II.]

# PRINCIPAL METEOROLOGICAL CONDITIONS IN MICHIGAN IN 1893.

## COMPARISONS OF CONDITIONS IN 1893 WITH THOSE IN PRECEDING YEARS.

## A COMPILATION OF REPORTS BY OBSERVERS FOR THE STATE BOARD OF HEALTH AND FOR THE UNITED STATES WEATHER BUREAU.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE MICHIGAN STATE BOARD OF HEALTH.

In the Annual Reports of this Board, there has been published for each of the years 1877 to 1892, inclusive, a summary relative to the principal meteorological conditions as observed during the year. This paper continues the subject for the year 1893. The names of the observers for that year, and the months in that year for which copies of registers of meteorological conditions were received from each, are stated in Exhibit 1, page 2. In Exhibit 2, page 3, is given the latitude, longitude, and elevation of each of these stations. In the tables which follow, reports received from any observer for less than half the year have not been used.

The principal conditions treated in the following tables are temperature and humidity of the air, cloudiness, fogs, rainfall, ozone, velocity and direction of the wind, and pressure of the atmosphere. The tables on each subject are illustrated by diagrams representing to the eye variations in the given condition from month to month through the year, at the several localities represented.

These tables give not only the meteorological conditions for the year and month under consideration, but they also contain, for purposes of comparison, statements of the average conditions for the longest period available in each case.

In the latter part of the Report for 1886, there was published an article on "The Causation of Pneumonia," in which extensive use was made of meteorological statistics, especially those relating to the meteorology of Michigan. In the Report for 1887, in an article on "The Causation of the Cold-weather Diseases," influenza, tonsillitis, bronchitis, scarlet fever, diphtheria, and small-pox are proved to sustain very close relations to meteorological conditions. Extensive use of meteorological and sickness statistics is made in the Report for 1887, in an article entitled "The Relations of Certain Meteorological Conditions to Diseases of the Lungs and

Air-passages." In the Report for 1891, "Abstract of Proceedings, April 14, 1891," in a discussion on the subject of "The Causation of Influenza," is an important use of the meteorological data, with diagrams and other evidence, showing how closely influenza is associated with atmospheric temperature, humidity, ozone and wind. In the Report for 1891, page cxxvii, is an article entitled "Relations of Certain Meteorological Conditions to Diseases of the Lungs and Air-passages in Colorado," in which are also data relative to other States and countries. In each of the Annual Reports of this Board since that for the year 1877 considerable use has been made of the sickness statistics in Michigan, for the complete study of which, data of the meteorological conditions coincident with the sickness is required.

EXHIBIT 1.—*Names of observers whose reports are summarized in the following Meteorological Tables and Diagrams, their places of observation, and the counties and geographical divisions of the State in which these places are situated, and months for which reports were received from each observer.*

| Name of Observer. | Place of Observation. | County. | Division of the State.* | Months (inclusive) for which Registers were Received. |
|---|---|---|---|---|
| W. C. Gates, M. D. | Rockland | Ontonagon | U. P. | Jan. to Apr., June to Dec. |
| P. McDonough, Observer, U. S. Weather Bureau | Marquette | Marquette | U. P. | January to December. |
| C. L. Bozell, Observer, U. S. Weather Bureau | Sault Ste. Marie | Chippewa | U. P. | January to December. |
| S. L. Dosher, Observer, U. S. Weather Bureau | Manistee | Manistee | N. W. | January to April. |
| A. E. Hackett, Observer, U. S. Weather Bureau | Manistee | Manistee | N. W. | June to August. |
| S. E. Wait | Traverse City | G'd Traverse | N. W. | January to December. |
| H. McP. Baldwin, Observer, U. S. Weather Bureau | Alpena | Alpena | N. E. | January to December. |
| D. W. Mitchell, M. D. | Harrisville | Alcona | N. E. | January to December. |
| Geo. W. Felger, Observer, U. S. Weather Bureau | Grand Haven | Ottawa | W. | January to December. |
| J. W. Ash | Ashton | Osceola | N. C. | January to November. |
| Wm. M. Edmondson, Observer, U. S. Weather Bureau | Port Huron | St. Clair | B. & E. | January to December. |
| John S. Caulkins, M. D. | Thornville | Lapeer | B. & E. | January to December. |
| Prof. R. C. Kedzie | Agr'l College | Ingham | C. | January to December. |
| Wm. M. Force | Office State B'd of Health, Lansing | Ingham | C. | January to December. |
| Prof. Chas. E. Barr | Albion | Calhoun | S. C. | Jan. to Aug. and Oct. to Dec. |
| Asaph Hall, Jr., Director Detroit Observatory | Ann Arbor | Washtenaw | S. C. | January to December. |
| J. H. Kellogg, M. D. | Battle Creek | Calhoun | S. C. | January to December. |
| Wm. M. Edwards, M. D., Supt. Asylum for Insane | Kalamazoo | Kalamazoo | S. C. | January to December. |
| Geo. H. Greene, M. D. | Marshall | Calhoun | S. C. | January to October. |
| Lewis Marvill | Parkville | St. Joseph | S. C. | January to December. |
| C. E. Beers | Tecumseh | Lenawee | S. C. | January to April. |
| C. C. Tefft | Tecumseh | Lenawee | S. C. | May to December. |
| S. Alexander | Birmingham | Oakland | S. E. | January to December. |
| Edward A. Evans, Director Mich. Weather Service & L. F. O. | Detroit | Wayne | S. E. | January to December. |

* The counties in each division are stated in Exhibit I. on subsequent page.

The article in this Report in relation to "Causes of Diseases," based upon weekly reports of sickness in Michigan, may well be studied in connection with this article, the main purpose of which is to serve as a basis for studies of the causes of diseases.

It is believed that there is nowhere else so complete a statement of the facts relating to the meteorology of Michigan as is here presented, for any use for which such knowledge may be needed, now or hereafter.

EXHIBIT 2.—*Latitude and Longitude, Elevation above Sea Level, and the Average Temperature, and Average Barometric Pressure in 1893, at 8 Meteorological Stations in Michigan,—the names of the Stations being arranged in order by latitude, highest first.*

| Localities in order of Latitude, those farthest North, first. | Latitude North. | Longitude West from Greenwich. | Altitude (Approximate) above Sea Level.—Feet. | Height of Mercury in Cistern of Barometer above Sea Level.—Feet. | Average Temperature, 1893, Degrees Fahr. | Average Atmospheric Pressure, 1893. Inches of Mercury corrected for Temp. |
|---|---|---|---|---|---|---|
| Rockland | | | 1,190.34 | | | |
| Marquette | 46°34′ | 87°24′ | 669. | | | |
| Sault Ste. Marie | 46°28′ | 84°22 | 642. | | | |
| Alpena | 45°5′ | 83°3 | 587. | | | |
| Traverse City | 44°45′ | 85°40′ | 598. | 605. | 43.76 | 29.269 |
| Harrisville | 44°39′ | 83°18′ | 616. | | 40.76 | |
| Manistee | 44°13′ | 86°16′ | 600. | | | |
| Ashton | 43°58′ | 85°45′ | 700. | | | |
| Grand Haven | 43°5′ | 86°18′ | 590. | | | |
| Port Huron | 43°0′ | 82°26 | 602. | | | |
| Thornville | * 42°55′ | * 83°10′ | § 975. | § 980. | 46.99 | 28.915 |
| Agricultural College | 42°44′ | 84°29 | 820. | 834. | 44.98 | 29.019 |
| Lansing, S. B. of H. | † 42°44 | † 84°33′ | ¶ 900. | 917. | 46.03 | 29.044 |
| Birmingham | 42°30 | 83°10′ | ‡ 752. | | 47.08 | 29.091 |
| Detroit | 42°20′ | 83°3 | 603.9 | | | |
| Battle Creek | 42°20 | 85°11 | 800. | | 48.27 | 29.031 |
| Kalamazoo | 42°18 | 85°37 | 944. | | | |
| Ann Arbor | 42°17′ | 83°44 | 930. | 936. | 46.50 | 29.010 |
| Marshall | 42°17 | 84°58′ | 833. | 886. | | |
| Albion | 42°14 | 84°45 | 965. | 985.25 | | |
| Tecumseh | * 42°1 | * 83°57 | 835. | | 46.40 | 29.102 |

* Estimated from lines on a map of Michigan, issued by the General Land office, Department of the Interior, 1878. For stations having no reference mark, the latitude and longitude were stated by the observer on the meteorological reports received.

† The exact latitude and longitude of the astronomical post placed in the ground near the new Capitol at Lansing, by the U. S. Lake Survey in 1875, as determined by the observations then made, is 42°43′ 53.11″ N. and 84°33′ 19.68″ W.

‡ Estimated from data on "Railroad Profiles," pages 179-187, Annual Report of the State Board of Health for 1878.

§ Estimated from data in Tackabury's Atlas of the State of Michigan.

¶ Estimated from comparisons of barometrical observations at Lansing, Port Huron, and Grand Haven for the four years, 1879-82.

NOTE.—Green's standard barometer was used at the above stations for the year 1893.

EXHIBIT 3.—*Average Temperature by Years and Months, for each of the Years 1877–93, and the Average for the 16 Years, 1877–92. These Averages are for Groups of Several Stations in Michigan.*

| Years, etc. | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Av. for 16 Yrs., '77-92 | 46.14 | 21.37 | 23.85 | 29.38 | 44.32 | 55.82 | 65.81 | 70.56 | 67.93 | 61.18 | 49.37 | 36.19 | 27.87 |
| 1877 | 48.67 | 19.18 | 32.27 | 25.92 | 46.71 | 58.24 | 67.48 | 72.80 | 70.52 | 63.80 | 52.78 | 37.57 | 36.73 |
| 1878 | 49.24 | 27.17 | 29.75 | 41.46 | 52.27 | 54.73 | 65.18 | 74.22 | 70.92 | 63.99 | 50.13 | 38.34 | 22.74 |
| 1879 | 46.82 | 20.86 | 20.69 | 33.08 | 44.29 | 58.03 | 64.70 | 73.16 | 68.99 | 57.43 | 57.43 | 36.80 | 26.41 |
| 1880 | 46.55 | 34.06 | 27.93 | 31.00 | 44.39 | 62.27 | 67.41 | 69.39 | 68.07 | 59.54 | 46.69 | 27.24 | 20.67 |
| 1881 | 47.22 | 14.93 | 19.75 | 29.36 | 40.53 | 62.72 | 63.32 | 72.95 | 71.76 | 67.99 | 51.87 | 37.42 | 34.03 |
| 1882 | 47.14 | 24.32 | 33.42 | 34.12 | 42.65 | 51.04 | 64.43 | 67.84 | 69.05 | 61.70 | 53.53 | 37.90 | 25.72 |
| 1883 | 43.52 | 15.78 | 20.03 | 24.63 | 43.00 | 51.37 | 64.73 | 68.36 | 65.41 | 57.24 | 46.73 | 38.10 | 26.89 |
| 1884 | 44.72 | 15.14 | 20.94 | 28.78 | 42.00 | 54.38 | 67.04 | 66.70 | 66.10 | 64.72 | 51.56 | 34.53 | 24.77 |
| 1885 | 42.36 | 15.46 | 10.21 | 19.51 | 41.39 | 53.32 | 63.39 | 71.13 | 63.23 | 59.14 | 45.78 | 38.14 | 27.59 |
| 1886 | 44.82 | 18.72 | 21.18 | 30.10 | 46.04 | 54.69 | 63.31 | 68.68 | 67.36 | 61.15 | 51.84 | 34.32 | 20.44 |
| 1887 | 44.82 | 16.58 | 21.57 | 25.55 | 42.09 | 60.68 | 66.53 | 73.22 | 66.41 | 57.95 | 44.46 | 35.18 | 27.57 |
| 1888 | 45.03 | 15.93 | 21.65 | 25.89 | 42.81 | 53.40 | 68.03 | 70.95 | 68.05 | 58.20 | 46.01 | 38.73 | 30.70 |
| 1889 | 47.36 | 28.18 | 18.57 | 35.83 | 46.04 | 56.74 | 63.05 | 70.69 | 68.58 | 61.36 | 44.59 | 37.95 | 36.76 |
| 1890 | 46.99 | 30.06 | 30.07 | 27.47 | 45.23 | 52.41 | 69.93 | 71.29 | 65.28 | 58.06 | 48.88 | 38.60 | 26.65 |
| 1891 | 47.61 | 26.90 | 27.33 | 28.93 | 47.11 | 55.40 | 67.62 | 66.67 | 68.16 | 65.50 | 49.01 | 34.57 | 34.11 |
| 1892 | 45.33 | 18.72 | 26.26 | 28.44 | 42.50 | 53.73 | 66.79 | 70.87 | 68.91 | 61.08 | 48.87 | 33.61 | 24.16 |
| 1893 | 45.64 | 15.23 | 20.09 | 30.61 | 43.19 | 54.30 | 69.05 | 72.16 | 68.57 | 60.40 | 50.59 | 36.61 | 26.88 |

EXHIBIT 4.—*Average Temperature by Year and Months, for each of the Years 1879–93, and the Average for the 14 Years, 1879–92. at the Office of the State Board of Health, State Capitol, Lansing, Michigan.*

| Years, etc. | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Av. for 14 Yrs., '79-92 | 47.23 | 22.27 | 24.67 | 30.82 | 46.08 | 57.95 | 67.73 | 71.96 | 68.61 | 61.60 | 50.00 | 36.82 | 28.28 |
| 1879 | 48.87 | 21.78 | 22.49 | 36.27 | 47.54 | 60.88 | 67.71 | 75.86 | 70.05 | 58.11 | 59.50 | 38.22 | 27.46 |
| 1880 | 48.94 | 36.81 | 31.62 | 34.19 | 47.46 | 65.48 | 69.44 | 71.69 | 70.38 | 61.19 | 48.64 | 28.78 | 21.65 |
| 1881 | 49.59 | 16.98 | 22.27 | 30.59 | 43.23 | 66.94 | 65.99 | 75.41 | 74.63 | 71.33 | 53.63 | 38.78 | 35.28 |
| 1882 | 49.23 | 25.65 | 35.88 | 36.14 | 44.83 | 53.10 | 66.86 | 72.57 | 71.34 | 63.64 | 55.63 | 39.00 | 26.13 |
| 1883 | 45.69 | 17.01 | 22.07 | 28.04 | 46.42 | 53.28 | 66.98 | 70.42 | 67.78 | 59.42 | 48.31 | 40.09 | 28.47 |
| 1884 | 47.43 | 16.48 | 23.89 | 32.26 | 45.30 | 58.20 | 70.69 | 69.77 | 68.58 | 67.99 | 53.47 | 36.51 | 26.01 |
| 1885 | 43.01 | 15.85 | 10.49 | 21.57 | 43.97 | 55.71 | 65.26 | 73.35 | 63.28 | 55.86 | 45.43 | 38.21 | 27.14 |
| 1886 | 46.19 | 19.02 | 22.44 | 32.09 | 50.16 | 57.77 | 66.20 | 70.87 | 68.49 | 61.81 | 51.78 | 34.02 | 19.61 |
| 1887 | 46.69 | 18.26 | 24.39 | 27.81 | 45.27 | 64.24 | 69.44 | 75.76 | 67.06 | 58.66 | 45.19 | 36.59 | 27.63 |
| 1888 | 45.49 | 15.63 | 22.38 | 27.49 | 44.30 | 53.91 | 68.80 | 71.09 | 67.77 | 57.79 | 46.82 | 39.16 | 31.19 |
| 1889 | 47.65 | 29.00 | 18.89 | 36.81 | 46.91 | 56.99 | 63.36 | 70.59 | 68.46 | 61.32 | 44.39 | 37.71 | 37.31 |
| 1890 | 47.89 | 31.63 | 31.51 | 28.53 | 46.86 | 53.94 | 71.03 | 71.81 | 65.38 | 57.97 | 49.09 | 30.46 | 27.46 |
| 1891 | 48.27 | 27.74 | 29.13 | 29.59 | 48.12 | 56.01 | 68.27 | 66.84 | 68.20 | 65.87 | 49.30 | 34.80 | 35.23 |
| 1892 | 46.33 | 19.94 | 27.91 | 30.15 | 44.68 | 54.91 | 68.22 | 71.41 | 68.59 | 61.43 | 49.27 | 34.11 | 25.34 |
| 1893 | 46.03 | 15.09 | 20.68 | 32.19 | 43.98 | 55.20 | 69.14 | 72.14 | 68.47 | 60.22 | 51.19 | 36.40 | 27.70 |

EXHIBIT 5.—*Average Temperature by Year and Months, for each of the Years 1864–93, and the Average for the 29 Years, 1864–92, at the Agricultural College, Michigan.*

| Years, etc. | Annual Av. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Av. for 29 Yrs., '64-92 | 46.19 | 21.97 | 24.00 | 30.82 | 45.74 | 57.77 | 67.61 | 71.27 | 68.56 | 60.38 | 48.13 | 35.53 | 26.32 |
| 1864 | 47.32 | 22.26 | 27.32 | 31.74 | 45.86 | 60.19 | 67.62 | 74.52 | 70.72 | 59.62 | 45.74 | 37.88 | 24.27 |
| 1865 | 48.12 | 21.10 | 27.59 | 39.96 | 47.40 | 57.65 | 70.76 | 65.60 | 65.84 | 67.66 | 46.50 | 38.63 | 27.72 |
| 1866 | 45.60 | 21.16 | 22.71 | 29.60 | 48.94 | 55.04 | 66.60 | 71.72 | 62.60 | 55.80 | 49.50 | 37.94 | 25.53 |
| 1867 | 46.91 | 17.61 | 30.89 | 29.72 | 48.20 | 51.11 | 71.61 | 71.60 | 69.78 | 56.60 | 50.60 | 40.44 | 25.31 |
| 1868 | 46.34 | 19.00 | 18.72 | 37.80 | 43.68 | 59.08 | 68.46 | 77.19 | 70.33 | 58.77 | 45.19 | 36.77 | 21.16 |
| 1869 | 46.27 | 29.38 | 26.66 | 27.60 | 45.70 | 56.02 | 64.45 | 70.35 | 70.58 | 63.45 | 40.80 | 32.05 | 28.16 |
| 1870 | 49 11 | 25.37 | 24.25 | 30.28 | 50.39 | 64.32 | 70.87 | 74.40 | 70.11 | 63.66 | 52.45 | 38.40 | 24.80 |
| 1871 | 47.93 | 24.75 | 25.65 | 38.18 | 50.13 | 61.39 | 68.21 | 70.60 | 71.19 | 58.10 | 53.91 | 31.95 | 21.12 |
| 1872 | 45.54 | 21.59 | 21.34 | 24.75 | 47.39 | 58.48 | 71.82 | 74.91 | 71.22 | 62.03 | 47.44 | 29.80 | 15.74 |
| 1873 | 44.54 | 15.87 | 19.10 | 28.30 | 43.17 | 56.98 | 70.60 | 70.82 | 69.49 | 57.38 | 44.68 | 28.49 | 29.54 |
| 1874 | 47.05 | 27.70 | 25.51 | 32.30 | 36.87 | 59.58 | 70.61 | 72.02 | 69.39 | 62.85 | 49.10 | 35.00 | 26.96 |
| 1875 | 43.06 | 12.87 | 7.99 | 26.20 | 41.11 | 60.82 | 66.57 | 69.67 | 65.48 | 58.50 | 42.93 | 32.96 | 31.58 |
| 1876 | 46.17 | 30.22 | 27.38 | 30.55 | 44.16 | 57.95 | 68.14 | 72.48 | 71.55 | 56.30 | 43.74 | 36.33 | 15.28 |
| 1877 | 47.42 | 18.07 | 32.31 | 24.51 | 46.16 | 58.25 | 65.93 | 71.43 | 68.46 | 61.28 | 50.83 | 35.24 | 36.57 |
| 1878 | 48.29 | 29.11 | 28.07 | 40.90 | 50.55 | 54.57 | 64.08 | 73.04 | 70.15 | 63.15 | 48.33 | 36.29 | 21.29 |
| 1879 | 46.88 | 19.19 | 20.40 | 33.19 | 44.84 | 58.76 | 66.02 | 74.03 | 70.00 | 56.21 | 57.28 | 38.22 | 27.46 |
| 1880 | 47.32 | 37.10 | 29.19 | 35.50 | 45.87 | 64.30 | 67.60 | 68.04 | 68.58 | 55.83 | 46.23 | 27.52 | 22.07 |
| 1881 | 48.73 | 16.98 | 21.58 | 30.28 | 45.59 | 65.24 | 64.31 | 73.43 | 72.69 | 69.69 | 52.51 | 38.20 | 34.31 |
| 1882 | 47.57 | 24.89 | 35.12 | 35.96 | 44.70 | 52.73 | 66.49 | 67.71 | 69.52 | 59.98 | 52.67 | 36.30 | 24.80 |
| 1883 | 43.52 | 14.39 | 19.76 | 24.89 | 43.48 | 52.98 | 65.87 | 68.94 | 64.90 | 56.43 | 46.17 | 38.08 | 26.39 |
| 1884 | 45.66 | 15.46 | 23.43 | 29.89 | 43.66 | 56.90 | 68.92 | 67.95 | 66.91 | 65.06 | 50.91 | 34.11 | 24.71 |
| 1885 | 42.90 | 15.34 | 8.94 | 21.26 | 43.59 | 55.76 | 64.69 | 72.70 | 63.62 | 58.94 | 44.95 | 37.22 | 27.75 |
| 1886 | 46.20 | 18.78 | 22.27 | 31.33 | 50.18 | 58.06 | 65.72 | 70.68 | 69.30 | 62.07 | 52.37 | 33.94 | 19.74 |
| 1887 | 46.60 | 18.20 | 24.26 | 28.29 | 45.37 | 64.28 | 68.53 | 75.51 | 67.96 | 58.86 | 44.97 | 35.66 | 27.30 |
| 1888 | 45.03 | 15.40 | 21.95 | 27.03 | 44.03 | 53.65 | 67.89 | 70.53 | 67.55 | 57.76 | 45.70 | 38.50 | 30.39 |
| 1889 | 47.33 | 28.04 | 18.25 | 36.51 | 46.59 | 57.37 | 62.83 | 70.19 | 68.56 | 61.24 | 44.19 | 37.39 | 36.75 |
| 1890 | 47.60 | 31.54 | 31.54 | 28.15 | 47.08 | 53.69 | 70.40 | 71.04 | 65.42 | 57.76 | 49.11 | 39.06 | 26.45 |
| 1891 | 47.38 | 26.70 | 26.60 | 29.30 | 47.40 | 55.70 | 67.40 | 65.30 | 67.90 | 65 10 | 48.80 | 33.90 | 34.50 |
| 1892 | 45.88 | 19.19 | 27.30 | 29.86 | 44.50 | 54.50 | 67.70 | 70.29 | 68.30 | 60.80 | 48.30 | 34.20 | 25.59 |
| 1893 | 44.98 | 14.80 | 21.31 | 28.16 | 43.50 | 54.40 | 66.60 | 71.50 | 68.10 | 58.41 | 49.70 | 35.68 | 27.60 |

EXHIBIT 6.—*Statements of Meteorological Conditions in the year and in each month of the year 1893, compared with the annual and monthly averages for 1892, and for several stated periods of years. These statements and averages are for* **Groups of Several Stations in Michigan.**

| Meteorological Conditions. | 1893 Compared with Averages for Previous Years. | | In 1893 More (+), or Less (-), than in 1892. | Meteorological Conditions. | 1893 Compared with Averages for Previous Years. | | In 1893 More (+), or Less (-), than in 1892. |
|---|---|---|---|---|---|---|---|
| | No. of Years Averaged, end'g with 1892. | More (+), or Less (-), in 1893 than the Average for Previous Years. | | | No. of Years Averaged, end'g with 1892. | More (+), or Less (-), in 1893 than the Average for Previous Years. | |
| YEAR 1893. | | | | YEAR 1893. | | | |
| Av. Temp. | 16 | —.50° | +.31° | *Continued.* | | | |
| Range of Temp.* | 16 | —3° | —3° | Cloudiness | 16 | —2 per ct. | —3 per ct. |
| Av. Monthly Range of Temp.* | 16 | —1° | +1° | Rainfall | 16 | +1.70 in. | +3.26 in. |
| Av. Daily Range of Temp.* | 14 | —.09 | +.77 | Atmospheric Pressure | 16 | —.087 in. | —.036 in. |
| JANUARY. | | | | FEBRUARY. | | | |
| Av. Temp. | 16 | —6.14° | —3.49° | Av. Temp. | 16 | —3.76° | —6.17° |
| Range of Temp.* | 16 | = | —4° | Range of Temp.* | 16 | —9° | —9° |
| Av. Daily Range of Temp.* | 14 | —.85° | —1.57° | Av. Daily Range of Temp.* | 14 | +.93° | +4.14° |
| Cloudiness | 16 | +6 per ct. | +15 per ct. | Cloudiness | 16 | = | —12 per ct. |
| Rainfall | 16 | +.11 in. | +.39 in. | Rainfall | 16 | +.20 in. | +.62 in. |
| Atmospheric Pressure | 16 | —.198 in. | —.091 in. | Atmospheric Pressure | 16 | —.049 in. | —.019 in. |
| MARCH. | | | | APRIL. | | | |
| Av. Temp. | 16 | +1.23° | +2.27° | Av. Temp. | 16 | —1.13° | +.69° |
| Range of Temp.* | 16 | —7° | —5° | Range of Temp.* | 16 | —4° | +5° |
| Av. Daily Range of Temp.* | 14 | —83° | —.52° | Av. Daily Range of Temp.* | 14 | —3.08° | —2.80° |
| Cloudiness | 16 | —2 per ct. | + 8 per ct. | Cloudiness | 16 | +17 per ct. | +20 per ct. |
| Rainfall | 16 | +.14 in. | +1.01 in. | Rainfall | 16 | +2.30 in. | +2.61 in. |
| Atmospheric Pressure | 16 | —.076 in. | —.050 in. | Atmospheric Pressure | 16 | —.131 in. | —.118 in. |
| MAY. | | | | JUNE. | | | |
| Av. Temp. | 16 | —1.52° | +.57° | Av. Temp. | 16 | +3.24° | +2.26° |
| Range of Temp.* | 16 | —5° | +3° | Range of Temp.* | 16 | —3° | +8° |
| Av. Daily Range of Temp.* | 14 | —1.15° | +1.98° | Av. Daily Range of Temp.* | 14 | +.22° | +2.00° |
| Cloudiness | 16 | = | —18 per ct. | Cloudiness | 16 | —15 per ct. | —26 per ct. |
| Rainfall | 16 | —.59 in. | —2.54 in. | Rainfall | 16 | —.38 in. | —1.62 in. |
| Atmospheric Pressure | 16 | —.124 in. | —.013 in. | Atmospheric Pressure | 16 | —.025 in. | +.049 in. |

* By registering thermometers.

Comments on Exhibit 6 are printed on page 10.

The low temperature for May, January and February, and the small amount of rainfall for August 1893, are especially noticeable.

EXHIBIT 6.—CONTINUED.—*Meteorological Conditions at stations in Michigan, in months for the year 1893, compared with averages for corresponding months in preceding years.*

| Meteorological Conditions. | 1893 Compared with Averages for Previous Years. | | In 1893 More (+), or Less (-), than in 1892. | Meteorological Conditions. | 1893 Compared with Averages for Previous Years. | | In 1893 More (+), or Less (-), than in 1892. |
|---|---|---|---|---|---|---|---|
| | No. of Years Averaged, end'g with 1892. | More (+), or Less (-), in 1893 than the Average for Previous Years. | | | No. of Years Averaged, end'g with 1892. | More (+), or Less (-), in 1893 than the Average for Previous Years. | |
| JULY. | | | | AUGUST. | | | |
| Av. Temp. | 16 | +1.60° | +1.29° | Av. Temp. | 16 | +.64° | —.34° |
| Range of Temp.* | 16 | —5° | —3° | Range of Temp.* | 16 | —1° | +1° |
| Av. Daily Range of Temp.* | 14 | —.14° | —1.27° | Av. Daily Range of Temp.* | 14 | +2.04° | +2.19° |
| Cloudiness | 16 | —2 per ct. | +5 per ct. | Cloudiness | 16 | —13 per ct. | —8 per ct. |
| Rainfall | 16 | —.30 in. | +.44 in. | Rainfall | 16 | —2.03 in. | —1.70 in. |
| Atmospheric Pressure | 16 | —.043 in. | —.079 in. | Atmospheric Pressure | 16 | —.033 in. | +.007 in. |
| SEPTEMBER. | | | | OCTOBER. | | | |
| Av. Temp. | 16 | —.78° | —.68° | Av. Temp. | 16 | +1.22° | +1.72° |
| Range of Temp.* | 16 | +8° | +5° | Range of Temp.* | 16 | —3° | +3° |
| Av. Daily Range of Temp.* | 14 | +.35° | +.22° | Av. Daily Range of Temp.* | 14 | +.09° | —.87° |
| Cloudiness | 16 | —1 per ct. | +5 per ct. | Cloudiness | 16 | —11 per ct. | —1 per ct. |
| Rainfall | 16 | —.63 in. | —.49 in. | Rainfall | 16 | +1.07 in. | +2.84 in. |
| Atmospheric Pressure | 16 | —.102 in. | —.066 in. | Atmospheric Pressure | 16 | —.092 in. | —.017 in. |
| NOVEMBER. | | | | DECEMBER. | | | |
| Av. Temp. | 16 | +.42° | +3.00° | Av. Temp. | 16 | —.89° | +2.72° |
| Range of Temp.* | 16 | —6° | +3° | Range of Temp.* | 16 | +11° | +7° |
| Av. Daily Range of Temp.* | 14 | +.17° | +2.68° | Av. Daily Range of Temp.* | 14 | +1.12° | +3.04° |
| Cloudiness | 16 | —4 per ct. | —20 per ct. | Cloudiness | 16 | +6 per ct. | +1 per ct. |
| Rainfall | 16 | —.12 in. | —.09 in. | Rainfall | 16 | +1.14 in. | +1.79 in. |
| Atmospheric Pressure | 16 | —.099 in. | —.031 in. | Atmospheric Pressure | 16 | —.068 in. | —.008 in. |

* By registering thermometers.

EXHIBIT 7.—*Statements of Meteorological Conditions in the year and in each month of the year 1893, compared with annual and monthly averages for 1892, and for several stated periods of years—from observations by Prof. R. C. Kedzie*, **at the State Agricultural College, near Lansing, Michigan.**

| Meteorological Conditions. | 1893, Compared with Averages for Previous Years. No. of Years Averaged, end'g with 1892. | 1893, Compared with Averages for Previous Years. More (+), or Less (-), in 1893 than the Average for Previous Years. | In 1893 More (+), or Less (-), than in 1892. | Meteorological Conditions. | 1893, Compared with Averages for Previous Years. No. of Years Averaged, end'g with 1892. | 1893, Compared with Averages for Previous Years. More (+), or Less (-), in 1893 than the Average for Previous Years. | In 1893 More (+), or Less (-), than in 1892. |
|---|---|---|---|---|---|---|---|
| YEAR 1893. | | | | YEAR 1893. | | | |
| Av. Temp. | 29 | —1.51° | —.90° | *Continued.* | | | |
| Range of Temp.* | 20 | —1° | —4° | Cloudiness | 29 | —8 per ct. | —3 per ct. |
| Av. Monthly Range of Temp.* | 20 | —1° | +4° | Rainfall | 29 | —.11 in. | +1.37 in. |
| Av. Daily Range of Temp.* | 19 | +1.00° | +2.27° | Atmospheric Pressure | 18 | —.051 in. | —.077 in. |
| JANUARY. | | | | FEBRUARY. | | | |
| Av. Temp. | 29 | —7.17° | —4.39° | Av. Temp. | 29 | —2.69° | —5.99° |
| Range of Temp.* | 20 | +2° | —9° | Range of Temp.* | 20 | —7° | —9° |
| Av. Daily Range of Temp * | 19 | +5.72° | —3.54° | Av. Daily Range of Temp * | 19 | +.62° | +2.36° |
| Cloudiness | 29 | +6 per ct. | +15 per ct. | Cloudiness | 29 | 0 | —13 per ct. |
| Rainfall | 29 | —.02 in. | +.82 in. | Rainfall | 29 | —.22 in. | —.10 in. |
| Atmospheric Pressure | 18 | —.087 in. | —.069 in. | Atmospheric Pressure | 18 | +.028 in. | —.031 in. |
| MARCH. | | | | APRIL. | | | |
| Av. Temp. | 29 | —2.66° | —1.70° | Av. Temp. | 29 | —2.24° | —1.00° |
| Range of Temp.* | 20 | —1° | +5° | Range of Temp.* | 20 | —6° | +2° |
| Av. Daily Range of Temp.* | 19 | +.75° | +.60° | Av. Daily Range of Temp.* | 19 | —6.32° | —6.06° |
| Cloudiness | 29 | —4 per ct. | +5 per ct. | Cloudiness | 29 | +16 per ct. | +21 per ct. |
| Rainfall | 29 | +.42 in. | +1.51 in. | Rainfall | 29 | +2.47 in. | +2.77 in. |
| Atmospheric Pressure | 18 | +.011 in. | —.071 in. | Atmospheric Pressure | 18 | —.082 in. | —1.42 in. |
| MAY. | | | | JUNE. | | | |
| Av. Temp. | 29 | —3.37° | —.10° | Av. Temp. | 29 | —1.01° | —1.10° |
| Range of Temp.* | 20 | —6° | +1° | Range of Temp.* | 20 | —12° | —6° |
| Av. Daily Range of Temp.* | 19 | —4.74° | +1.32° | Av. Daily Range of Temp.* | 19 | —.60° | +5.23° |
| Cloudiness | 29 | +1 per ct. | —18 per ct. | Cloudiness | 29 | —10 per ct. | —19 per ct. |
| Rainfall | 29 | —.37 in. | —3.06 in. | Rainfall | 29 | +.80 in. | +.52 in. |
| Atmospheric Pressure | 18 | —.065 in. | —.032. in. | Atmospheric Pressure | 18 | +.040 in. | +.060 in. |

* By registering thermometers, set at 7 A. M., and recorded at 7 A. M., for the preceding calendar day.

Comments on Exhibit 7 are printed on page 10.

The low temperature for May and the small amount of rainfall for July and August, 1893, are especially noticeable.

EXHIBIT 7.—CONTINUED.—*Meteorological Conditions at the Agricultural College in months, for the year 1893, compared with averages for corresponding months in preceding years.*

| Meteorological Conditions. | 1893, Compared with Averages for Previous Years. | | In 1893 More (+), or Less (-), than in 1892. | Meteorological Conditions. | 1893, Compared with Averages for Previous Years. | | In 1893 More (+), or Less (-), than in 1892. |
|---|---|---|---|---|---|---|---|
| | No. of Years Averaged, end'g with 1992. | More (+), or Less (-), in 1893 than the Average for Previous Years. | | | No. of Years Averaged, end'g with 1892. | More (+), or Less (-), in 1893 than the Average for Previous Years. | |
| JULY. | | | | AUGUST. | | | |
| Av. Temp. | 29 | +.23° | +1.21° | Av. Temp. | 29 | —.46° | —.20° |
| Range of Temp.* | 20 | —1° | —4° | Range of Temp.* | 20 | +3° | +12° |
| Av. Daily Range of Temp.* | 19 | +1.28° | +2.65° | Av. Daily Range of Temp.* | 19 | +4.57° | +8.93° |
| Cloudiness | 29 | —5 per ct. | +7 per ct. | Cloudiness | 29 | —13 per ct. | —5 per ct. |
| Rainfall | 29 | —1.30 in. | —.14 in. | Rainfall | 29 | —2.32 in. | —4.56 in. |
| Atmospheric Pressure | 18 | —.012 in. | —.122 in. | Atmospheric Pressure | 18 | +.021 in. | —.005 in. |
| SEPTEMBER. | | | | OCTOBER. | | | |
| Av. Temp. | 29 | —1.97° | —2.39° | Av. Temp. | 29 | +1.57° | +1.40° |
| Range of Temp.* | 20 | +6° | +14° | Range of Temp.* | 20 | +5° | +8° |
| Av. Daily Range of Temp.* | 19 | +4.72° | +6.07° | Av. Daily Range of Temp.* | 19 | +3.20° | +.56° |
| Cloudiness | 29 | —6 per ct. | +1 per ct. | Cloudiness | 29 | —14 per ct. | +3 per ct. |
| Rainfall | 29 | —.99 in. | —.33 in. | Rainfall | 29 | +1.13 in. | +2.83 in. |
| Atmospheric Pressure | 18 | —.142 in. | —.152 in. | Atmospheric Pressure | 18 | —.120 in. | —.129 in. |
| NOVEMBER. | | | | DECEMBER. | | | |
| Av. Temp. | 29 | +.10° | +1.43° | Av. Temp. | 29 | +1.28° | +2.01° |
| Range of Temp.* | 20 | +5° | +14° | Range of Temp.* | 20 | +16° | +24° |
| Av. Daily Range of Temp.* | 19 | +4.55° | +4.40° | Av. Daily Range of Temp.* | 19 | +3.61° | +4.76° |
| Cloudiness | 29 | —5 per ct. | —20 per ct. | Cloudiness | 29 | +5 per ct. | —4 per ct. |
| Rainfall | 29 | —.11 in. | +.35 in. | Rainfall | 29 | +.38 in. | +.76 in. |
| Atmospheric Pressure | 18 | —.098 in. | —.113 in. | Atmospheric Pressure | 18 | —.113 in. | —.121 in. |

* By registering thermometers, set at 7 A. M., and recorded at 7 A. M., for the preceding calendar day.

## METEOROLOGICAL CHARACTERISTICS OF THE YEAR 1893 IN MICHIGAN.

At the several meteorological stations, in different parts of the State, the average temperature for 1893 was .50° lower than the average for the preceding 16 years; the annual range of temperature was 3° lower than in 1892, and 3° lower than the annual average range for the preceding 16 years; the average monthly range of temperature was 1° greater than in 1892, and 1° less than the average for the preceding 16 years; the average daily range of temperature was .77° greater than in 1892, and .09° less than the average for the preceding 14 years; the average cloudiness was 3 per cent less than in 1892, and 2 per cent less than the average for the preceding 16 years; the rainfall (rain and melted snow) was 3.26 inches greater than in 1892, and 1.70 inches greater than the average for the preceding 16 years; the average atmospheric pressure was .036 of an inch less than in 1892, and .087 of an inch less than the average for the preceding 16 years.

In Exhibit 6, pages 6, 7, is given by year and months, a comparison of conditions in 1893, in Michigan, with those in 1892, and with the averages for periods of years. June, July, March, October, August and November (naming the months in order of greatest difference) were the months in which the average temperature in 1893 was higher than the average for corresponding months in the preceding 16 years; January, February, May, April, December and September were months in which the average temperature in 1893 was lower than the average for corresponding months in the preceding 16 years.

## METEOROLOGICAL CHARACTERISTICS OF THE YEAR 1893, AT ONE CENTRAL STATION.

At the State Agricultural College, near Lansing, and near the center of the thickly-settled part of the State, the average temperature for 1893 was .90° lower than in 1892, and 1.51° lower than the average for the preceding 29 years; the annual range of temperature was 4° less than in 1892, and 1° less than the average for the preceding 20 years; the average monthly range of temperature was 4° greater than in 1892 and 1° less than the average for the preceding 20 years; the average daily range of temperature was 2.27° greater than in 1892, and 1.00° greater than the average for the preceding 19 years; the average cloudiness was 3 per cent less than in 1892, and 3 per cent less than the average for the preceding 29 years; the rainfall (rain and melted snow) was 1.37 inches more than in 1892, and .11 of an inch less than the average for the preceding 29 years; the average atmospheric pressure was .077 of an inch less than in 1892, and .051 of an inch less than the average for the preceding 18 years.

In Exhibit 7, pages 8 and 9, is given by year and months, a comparison of conditions in 1893, at the Agricultural College, with those in 1892, and with averages for periods of years. October, December, July and November (naming months in order of greater difference) were months in which the average temperature in 1893 was higher than the average for corresponding months in the preceding 29 years; January, May, February, March, April, September, June and August were months in which the average temperature in 1893 was lower than the average for corresponding months in the preceding 29 years, at that station which is near the central part of the State.

Whoever will carefully study Diagram No. 1 (p. 20) in this article, and in similar articles for preceding years, will see that thermometers and methods of observation have become so perfect that, given a curve representing correctly the temperature by months at one station in Michigan, curves can readily be constructed without actual records, wihch will somewhat closely represent the temperature at each of several other stations, because the curves for many stations run so nearly parallel that all that is necessary to do is to find the average difference of mean annual temperature at the station to be represented compared with the station for which the data are given. It may also be seen that a curve representing the temperature at a station in the central part of the State very closely resembles the curve representing the average for many stations representing nearly all parts of the State. This proves that the practice adopted many years ago of stating the meteorological characteristics at one central station is a reasonably safe practice, and it is especially useful when it enables us to gain a comparison for a longer period than can be made from records at many stations, and also when employed in advance of the receipt of records from all stations, as is the case when the weekly bulletins of "Health in Michigan" are issued, for the purposes, for which the meteorological conditions at the State Capitol are used to represent the conditions probably prevailing throughout the State.

## LOCAL METEOROLOGICAL PHENOMENA IN THE SEVERAL MONTHS OF THE YEAR 1893.

The following general remarks relative to temperature, frosts, effects on vegetation, migration of birds, etc., in 1893, are taken from the monthly reports by observers. The names of stations are appended; the names of observers are stated in Exhibit 1, page 2.

### JANUARY.

Depth of snow on ground, 14 inches, Jan. 15; Jan. 31, 24 inches.—*Harrisville.*

Jan. was colder by 7 or 8 degrees than the normal. At the close the ice on the seven ponds is about a foot thick. Snow is so drifted—difficult to estimate—probably about two feet deep. Good sleighing all the month.—*Thornville.*

Depth of snow on ground 18.3 inches, Jan. 15; Jan. 31, 16.4 inches.—*Marquette.*

Depth of snow on ground, 17.8 inches, Jan. 15; Jan. 31, 25.6 inches.—*Sault Ste. Marie.*

Depth of snow on ground, 22.2 inches, Jan. 31.—*Alpena.*

Depth of snow on ground, 24 inches, Jan. 15; Jan. 31, 14 inches. Harbor badly blocked by ice from Jan. 9 to 26th, which extended for miles into the lake, causing almost a suspension of navigation which is kept open by the boats of the D. G. H. and Mil. R. R.—*Grand Haven.*

Depth of snow on ground, 17.7 inches, Jan. 15; Jan. 31, 4 inches.—*Detroit.*

Depth of snow on ground, 10 inches, Jan. 15; Jan. 31, 5 inches.—*Lansing.*

Bees were out Jan. 25, 28.—*Parkville.*

### FEBRUARY.

Depth of snow on ground, 24 inches, Feb. 15 and 28.—*Harrisville.*

Feb. was cold and stormy—several degrees below the average for this latitude. There was good sleighing all the month where the roads were not too badly drifted. Snow in the woods nearly three feet deep at close. Ice on ponds about a foot—about the same in open—not much in sheltered grounds. It has been a steady cold winter.—*Thornville.*

Average depth of snow on ground, 15 inches, Feb. 15; Feb. 28, 14.5 inches.

Navigation almost suspended during the month on account of the immense amount of ice in the lake which frequently blocked up the harbor. The boats of the D. G. H. and Mil. R. R. made very few trips. —*Grand Haven.*

Depth of snow on ground, 4¾ inches, Feb. 15; Feb. 28, 8½ inches.—*Tecumseh.*

Depth of snow on ground, 12 inches, Feb. 15; Feb. 28, 22.5 inches.—*Marquette.*

Depth of snow on ground, 24.8 inches, Feb. 15; Feb. 28, 25.4 inches.—*Sault Ste. Marie.*

Depth of snow on ground, 19 inches, Feb. 28.—*Alpena.*

Depth of snow on ground, ½ inch, Feb. 15; Feb. 28, 5 inches.—*Detroit.*

Depth of snow on ground, 5 inches, Feb. 14; Feb. 28, 6 inches.—*Lansing.*

Bees were out Feb. 26 and 27.—*Parkville.*

## MARCH.

Depth of snow on ground, 18 inches, Mar. 15. No snow on ground Mar. 31.—*Harrisville.*

Robins, bluebirds and blackbirds seen Mar. 11.

March was a little colder than the normal. Sleighing lasted till about the 10th. The earth was so well covered with snow that the wheat and clover wintered well under it. There was so little frost in the ground that mud has been as bad as usual and there is promise of a pretty early spring. Peach buds were not all killed by the winter's cold. As the month closed the frost is about all out of the ground, but the ice is still on the seven ponds.—*Thornville.*

Disappearance of ice, Mar. 18. Melting snow on the ground, Mar. 6, 7, 8, 9, 10, 11.—*Albion.*

Rain during the night, froze as fast as it fell, covering trees, etc., with ice, Mar. 23.—*Ann Arbor.*

Depth of snow on ground, ½ inch, Mar. 15. No snow on ground, Mar. 31.—*Tecumseh.*

Depth of snow on ground, 16.5 inches, Mar. 15; Mar. 31, 4 inches.—*Marquette.*

Depth of snow on ground, 20.8 inches, Mar. 15; Mar. 31, 8 inches.—*Sault Ste. Marie.*

Navigation opened, Mar. 29. Depth of snow on ground, 0.2 inch, Mar. 15. No snow on ground Mar. 31. —*Detroit.*

Melting snow on ground, Mar. 4, 5, 6, 7, 8, 9, 10, 19, 23.

Frosts, Mar. 8, 20, 26, 27, 28, 29. Robins and bluebirds first seen, Mar. 8; blackbirds, song sparrows and meadow larks, Mar. 10. Ice breaking up in Grand River, Mar. 10. Grand River open, Mar. 13. Depth of snow on ground, 1 inch in patches.—*Lansing.*

Wild geese seen, Mar. 9; robins and spring birds, Mar. 10.—*Parkville.*

Average depth of snow on ground, Mar. 15, 0.08 inch. At end of month, none.—*Grand Haven.*

## APRIL.

Rain during the night, froze as fast as it fell, covering trees, etc., with ice, Apr. 19.—*Ashton.*

Frogs first heard, Apr. 1. Remains of snow drifts still seen, Apr. 9. Ground covered with 3 inches of snow, Apr. 15; melted by 3:00 P. M. Ground froze every night except Apr. 30.

April was wet with cold nights—not favorable for work or the growth of grass and spring grains but quite so for wheat. Very little oats or peas sowed yet and not very much plowing done. Wheat is not looking well—badly winter-killed. The prospect for fruit of all kinds is good, even peaches, the buds of which are not all killed by the winter. Clover roots are not badly killed.—*Thornville.*

Depth of snow on ground 1¾ inches, Apr. 15; no snow on ground, Apr. 30.—*Tecumseh.*

Killing frost, Apr. 23. Trace of snow on ground, Apr. 15 and 30.—*Marquette.*

Light frosts, Apr. 16, 18, 30. Navigation opened, Apr. 29. No snow on ground, Apr. 15 and 30.—*Sault Ste. Marie.*

Navigation opened, Apr. 10.—*Alpena.*

Navigation opened, Apr. 29.—*Detroit.*

Killing frost, Apr. 2. Light frosts, 5, 11, 17. Frost out of ground except in some places, Apr. 3; plowing began. Wild geese flying north, Apr. 2. Ice formed, Apr. 14, 15, 26.—*Lansing.*

April has been cold and cloudy.—*Parkville.*

## MAY.

Ground froze, at night, May 4, 5, 6, 7, 8. Light frosts, May 6, 24. Catbirds first seen, May 3; Phebe bird and king bird, May 4; Baltimore oriole, May 11; chewink, May 29. Apple, plum and poplar leafing, maple and juneberry blossoming, May 12. Strawberries and dandelions blossoming, mandrakes coming up, May 14. Early cherries blossoming, elm and thorn leafing, May 17. Peach trees blossoming, May 19. Sour cherries blossoming, May 20. Apple trees blossoming, yellow oak leafing, May 22. White oak leafing, May 24.

May was cool and dry, the last half almost a drought; very favorable for work but not for growth of vegetation. Wheat has done the best, and that like everything else is backward. The promise of fruit except apples is good.—*Thornville.*

Killing frost, May 6. Navigation opened May 7.—*Marquette.*

Light frosts, May 6, 7.—*Grand Haven.*

Frosts, May 8, 19.—*Port Huron.*

Light frosts, May 6, 19. Bobolinks first heard May 5; Killdeer May 13.—*Lansing.*

Ice formed, May 6. Frosts, May 6, 7, 8, 19.—*Parkville.*

### JUNE.

Dogwood blossoming, June 4. June clover blossoming June 6. Wheat heading, blackberries blossoming, June 9. Locust blossoming, June 12. Fire flies seen, June 18.

A month of about normal temperature; few very hot days. The fore part of the month was wet, the latter part a drought. There was precipitation enough if it had been well distributed, but nearly all fell in the two big rains of June 3 and 10. The dry weather was good for work and except oats nothing has really suffered for rain.—*Thornville.*

Light frost, June 7.—*Alpena.*

### JULY.

Not very hot for the season, only five days of 90° and upward. Quite dry—a drought at the close, excellent weather for haying and wheat harvest. The crops were large and of good quality. Grasshoppers were never so plentiful before; they did some damage, mostly to oats and clover seed.—*Thornville.*

### AUGUST.

Katydids first heard, Aug. 4. A month of great drought and notable for the grasshopper plague, something new, here. The damage done to growing crops is great in the order mentioned—clover seed, oats, gardens, beans and potatoes, corn and wheat. The damage to the last was by the twine band being eaten in two.—*Thornville.*

Frost sufficient to kill buckwheat on low ground was observed in this vicinity on the morning of Aug. 30.—*Tecumseh.*

Light frost, Aug. 29.—*Marquette.*

Light frost, Aug. 30.—*Sault Ste. Marie.*

Light frosts, Aug. 13, 14, 30.—*Alpena.*

Light frost, Aug. 30.—*Grand Haven.*

Frost, Aug. 30.—*Port Huron.*

Light frost on low ground, Aug. 29, 30.—*Lansing.*

Light frost, Aug. 30.—*Parkville.*

### SEPTEMBER.

Killing frosts, Sept. 26, 27, 29. Barn swallows all gone Sept. 1. Yellow birds going, Sept. 20. Robins and Bobolinks going, Sept. 25. A month of severe drought—perhaps the worst ever known here. On account of it wheat seeding was very late and there was almost no pasturage for cattle. This condition was not altogether due to the drought but partly to the grasshoppers.—*Thornville.*

Light frost on low land, Sept. 24. Heavy frost on high and low land, Sept. 26. Frost, Sept. 27, 28, 29. —*Ann Arbor.*

Light frost, Sept. 17. Killing frost, Sept. 29.—*Marquette.*

Light frost, Sept. 9. Killing frosts, Sept. 24, 28, 29.—*Sault Ste. Marie.*

Frosts, Sept. 9, 20, 24, 26, 27, 29.—*Alpena.*

Killing frosts, Sept. 26, 27, 28, 29.—*Grand Haven.*

Frosts, Sept. 24, 26.—*Port Huron.*

Killing frosts, Sept. 26, 29.—*Detroit.*

Light frosts, Sept. 2, 17. Killing frosts, Sept. 24, 26, 27, 28, 29. Ice formed, Sept. 26, 27, 28, 29.—*Lansing.*

Light frosts, Sept. 2, 3. Killing frost, Sept. 29. Ice formed, Sept. 26, 27, 28, 29.—*Parkville.*

### OCTOBER.

Trace of snow, Oct. 14.—*Harrisville.*

Frost, nights of Oct. 16, 17, 18. Snow, Oct. 28. A very fine month; good for work as well as growth of wheat. More rain would have been useful.—*Thornville.*

Heavy frosts, Oct. 16, 17, 29. Light frosts, Oct. 18, 19. First snowfall of season, Oct. 28.—*Albion.*

Frosts, Oct. 16, 17, 18, 21, 25, 31. A few flakes of snow, Oct. 28.—*Ann Arbor.*

First snow, Oct. 28.—*Marshall.*

Frosts, Oct. 16, 27. Depth of snow on ground Oct. 31, 0.3 of an inch.—*Marquette.*

Light frost, Oct. 9. Killing frosts, Oct. 24, 28, 29.—*Sault Ste. Marie.*

Frosts, Oct. 16, 21.—*Alpena.*

Killing frost, Oct. 16.—*Grand Haven.*

First snow of season, Oct. 28.—*Port Huron.*

Wild geese flying south, Oct. 13. Frosts, Oct. 16, 17, 18, 21, 25. Ground froze, first time of season, Oct. 16. Light snow flurries, first of season, Oct. 28.—*Lansing.*

Frosts, Oct. 16, 17, 18, 19, 21, 22, 25, 29, 30, 31. Wild geese flying south, Oct. 30.—*Parkville.*

### NOVEMBER.

Frosts, Nov. 3, 4, 5, 6, 7, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30. Inappreciable snow, Nov. 14, 15, 19. A fine month, good for fall work. Dry until latter part.—*Thornville.*

Depth of snow on ground, 1 inch, Nov. 30.—*Adrian.*

Frosts, Nov. 3, 4, 5, 6, 7, 14, 19, 20, 26. Depth of snow on ground, ½ inch, Nov. 15.—*Ann Arbor.*

Trace of snow, Nov. 15.—*Birmingham.*

Depth of snow on ground, one-tenth inch, Nov. 15; Nov. 30, 12.2 inches.—*Marquette.*

Depth of snow on ground, two-tenths inch, Nov. 15; Nov. 30, 4 inches.—*Grand Haven.*

Depth of snow on ground, one-tenth inch, Nov. 15; Nov. 30, six-tenths inch.—*Detroit.*

Frosts, Nov. 3, 4, 5, 6, 7, 9, 20. Melting snow on ground, Nov. 16, 17. Grand River closed, first time of season, Nov. 23. Depth of snow on ground, 1 inch, Nov. 15; Nov. 30, 2 inches.—*Lansing.*

Depth of snow on ground, 4 inches, Nov. 15; Nov. 30, 3 inches.—*Parkville.*

23 inches of snow fell during the month.—*Traverse City.*

### DECEMBER.

Depth of snow on ground, about 12 inches, Dec. 31.—*Harrisville.*

December was a cloudy, stormy, unpleasant month but not severely cold. After the snow melted, the wheat and grass showed very fresh and green. More snow ought to fall to save them from injury that freezing and thawing will cause.—*Thornville.*

Depth of snow on ground, 7 inches, Dec. 15; ½ inch, Dec. 31.—*Adrian.*

Depth of snow on ground, 35.1 inches, Dec. 15; Dec. 31, 37.4 inches.—*Marquette.*

Navigation closed, Dec. 9.—*Alpena.*

Depth of snow on ground, 2 inches, Dec. 15; Dec. 31, 1 inch.—*Grand Haven.*

Navigation closed, Dec. 15. Depth of snow on ground, 1 inch, Dec. 15; trace of snow, Dec. 31.—*Detroit.*

First sleighing of the season, Dec. 2. Grand River opened, Dec. 24. Snow went off with heavy rain, Dec. 15. No snow on ground, Dec. 31.—*Lansing.*

Bees were out, Dec. 23 and 24. No frost in ground from Dec. 22 to 26. Regular April weather.—*Parkville.*

## MEASUREMENTS AND TEMPERATURE OF GROUND WATER.

In a paper entitled "Typhoid Fever and Low Water in Wells," on pages 89–114 of the Report of this Board for 1884, it is shown that for the years 1878–82 there was a relation between the sickness and deaths from typhoid fever in Michigan and the depth of water in wells. In the month of October, when the water in wells reached the lowest point in the year, there were the most deaths and sickness from typhoid fever; and following the month of April, when the water in wells was highest, there were the least deaths and sickness from typhoid fever. When this comparison is made in a diagram, it is found that, "beginning with June in each year the curve representing sickness from typhoid fever follows more or less closely the curve representing the average depth of earth above the ground water."

On page 256, of the Report of this Board for the year 1889, is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the 10 years, 1878 and 1880–88.

On page 229 of the Report for 1891 also on page 226 of the report for 1892, is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the twelve years, 1878 and 1880–90.

On page 271 of the Report for 1893 is a diagram exhibiting the relation of typhoid fever to low water in wells, in Michigan, for the fourteen years, 1878 and 1880–92.

Typhoid fever being one of the most important causes of death in Michigan, it is of very great importance that further evidence be collected on this important subject.

The measurements for each month in 1893, of the depth of a well at each of seven places in Michigan, are shown in Exhibit 8; also the depth of earth above the water, and the temperature of the water in each of the wells. It is hoped that these measurements and observations may continue, and permit a more extended comparison of the depth of water in wells with the sickness from typhoid fever, and with sickness and deaths fom other diseases.

## CHANGE OF EXPOSURE OF INSTRUMENTS AT LANSING IN 1884.

Comments on the subject of a new instrument shelter at Lansing are printed on page 21, Report for 1885. Exhibits A, B, C, and D, pages 22 and 23, of the Report for 1886, relate to that subject, and may be studied in connection with what is said on page 21, Report for 1885. The fact of the change of place of observation in 1884 may need to be taken into account by whoever studies the meteorology at Lansing through a long series of years.

EXHIBIT 8.—*Depth of Wells: Depth of Ground above Water in Well; Temperature of Water in Well, and day of observation of such temperature, in each month of the year 1893, as reported by Meteorological observers for the State Board of Health, and for the United States Weather Bureau.*

| Stations in Michigan. | January. | | | February. | | | March. | | | April. | | | May. | | | June. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. |
| Traverse City* | 55 | 40 10 | $47^{23}$ | 55 | 40 9 | $47^{23}$ | 55 | 40 8 | $47^{21}$ | 55 | 40 8 | $47^{29}$ | 55 | 39 4 | $47^{28}$ | 55 | 40 5 | $46^{22}$ |
| Lansing, S. B. of H. | 26 11½ | 25 8½ | $50^{16}$ | 26 11½ | 25 5 | $48^{14}$ | 26 11½ | 25 4 | $47^{16}$ | 26 11½ | 24 9¾ | $48^{15}$ | 26 11½ | 24 3¼ | $48^{16}$ | 26 11½ | 23 8⅜ | $49^{15}$ |
| Ann Arbor | 15 | 14 2 | $35^{18}$ | 15 | 12 | $39^{18}$ | 15 | 10 2 | $38^{19}$ | 15 | 6 4 | $41^{19}$ | 15 | 10 1 | $46^{19}$ | 15 | 11 6 | $51^{16}$ |
| Battle Creek | 60 10 | 57 4 | $44^{16}$ | 60 10 | 57 8 | $44^{16}$ | 60 10 | 56 3 | $46^{16}$ | 60 10 | 58 8 | $48^{16}$ | 60 10 | 54 2 | $50^{16}$ | 60 10 | 55 1 | $52^{16}$ |
| Kalamazoo | 25 | 15 | $44^{14}$ | 25 | 15 | $44^{15}$ | 25 | 15 | $45^{16}$ | 25 | 15 | $46^{15}$ | 25 | 15 | $47^{14}$ | 25 | 15 | $50^{15}$ |
| River Raisin † | 23 | 17 6 | $48^{15}$ | 23 | 16 6 | $48^{15}$ | 23 | 17 6 | $48^{15}$ | 23 | 16 | $48^{15}$ | 23 | 16 6 | $55^{15}$ | 23 | 15 | $48^{15}$ |
| Hillsdale | 30 6 | 25 8 | $50^{25}$ | 30 6 | 23 6 | $50^{15}$ | 30 6 | 23 1 | $46^{15}$ | 30 6 | 18 6 | $48^{15}$ | 30 6 | 19 5 | $48^{15}$ | 30 6 | 19 7 | $49^{15}$ |

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

* At Northern Michigan Asylum, W. H. Bauld, observer.

† D. W. Palmer, observer.

EXHIBIT 8.—*Depth of Wells, etc.*—CONTINUED.

| Stations in Michigan. | July. | | | August. | | | September. | | | October. | | | November. | | | December. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. | Depth of Well.—Ft., In. | Depth of Ground above Water in Well.—Ft., In. | Temp. of Water in Well. —Deg. F. |
| Traverse City* | 55 | 40 10 | $46^{22}$ | 55 | 40 5 | $48^{22}$ | 55 | 40 9 | $46^{28}$ | 55 | 40 9 | $47^{21}$ | 55 | 40 8 | $48^{20}$ | 55 | 40 4 | $47^{23}$ |
| Lansing, S. B. of H. | 26 11½ | 23 8½ | $49^{15}$ | 26 11½ | 23 11½ | $50^{16}$ | 26 11½ | 24 5 | $51^{15}$ | 26 11½ | 24 7⅞ | $52^{17}$ | 26 11½ | 24 11 | $52^{15}$ | 26 11½ | 24 4 | $51^{16}$ |
| Ann Arbor | 15 | 12 5 | $57^{15}$ | 15 | 13 9 | $56^{16}$ | 15 | 14 | $56^{17}$ | 15 | 14 1 | $54^{17}$ | 17 | 14 3 | $48^{17}$ | 17 | 10 8 | $42^{17}$ |
| Battle Creek | 60 10 | 55 10 | $52^{15}$ | 60 10 | 55 10 | $52^{16}$ | 60 10 | 55 10 | $52^{16}$ | 60 | 55 6 | $52^{14}$ | 60 | 55 7 | $52^{20}$ | 60 8 | 55 8 | $46^{17}$ |
| Kalamazoo | 25 | 15 | $52^{16}$ | 25 | 15 | $54^{15}$ | 25 | 15 | $52^{16}$ | 25 | 15 | $50^{15}$ | 25 | 15 | $48^{15}$ | 25 | 15 | $48^{15}$ |
| River Raisin† | 23 | 17 | $48^{14}$ | 23 | 17 6 | $45^{15}$ | 23 | 17 6 | $48^{15}$ | 23 | 16 | $48^{15}$ | 23 | 17 | $48^{14}$ | 23 | 16 | $48^{15}$ |
| Hillsdale | 30 6 | 21 | $50^{15}$ | 30 6 | 22 6 | $50^{15}$ | 30 6 | 24 | $50^{15}$ | 30 6 | 24 8½ | $50^{15}$ | 30 6 | 25 11 | $50^{15}$ | 30 6 | 24 2 | $50^{15}$ |

NOTE.—The small figures above and at the right of the numbers denoting the degrees of temperature, state the day of the month on which the observation was made.

* At Northern Michigan Asylum, W. H. Bauld, observer.

† D. W. Palmer, observer.

## TEMPERATURE OF THE ATMOSPHERE.

Compared with the average for the preceding 29 years at the Agricultural College, the temperature for January was low. A comparison, by months, of temperature in 1893, with the averages for corresponding months in the preceding 29 years, 1864–92, at the Agricultural College, near Lansing, is given in Exhibit 10, page 19.

The average temperature, by months, for the 14 years, 1879–92, at Lansing, and a comparison of 1893, by months, with that average, are stated in Exhibit 11.

The average temperatures at each of 13 stations in Michigan, and the average for 9 stations in 1893, and in each month of that year, are stated in Table I., page 21.

EXHIBIT 9.—*Average Temperature by Year and Months in 1893,* compared with Annual and Monthly Averages for 1892, and for the 16 Years, 1877-1892. These Averages are for Groups of Several Stations in Michigan.*

| Years, etc. | Average Temperature—Degrees Fahr. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 16 years, 1877-92 | 46.14 | 21.37 | 23.85 | 29.38 | 44.32 | 55.82 | 65.81 | 70.56 | 67.93 | 61.18 | 49.37 | 36.19 | 27.87 |
| Av. 14 years, 1879-92 | 45.74 | 21.12 | 22.83 | 28.76 | 43.58 | 55.73 | 65.73 | 70.14 | 67.53 | 60.79 | 49.09 | 35.94 | 27.61 |
| 1892 (12 stations) | 45.33 | 18.72 | 26.26 | 28.44 | 42.50 | 53.73 | 66.79 | 70.87 | 68.91 | 61.08 | 48.87 | 33.61 | 24.16 |
| 1893 (9 stations) | 45.64 | 15.23 | 20.09 | 30.61 | 43.19 | 54.30 | 69.05 | 72.16 | 68.57 | 60.40 | 50.59 | 36.61 | 26.88 |
| In 1893 **Higher** than Av. for 16 years, 1877-92 | ...... | ...... | ...... | 1.23 | ...... | ...... | 3.24 | 1.60 | .64 | ...... | 1.22 | .42 | ...... |
| In 1893 **Lower** than Av. for 16 years, 1877-92 | .50 | 6.14 | 3.76 | ...... | 1.13 | 1.52 | ...... | ...... | ...... | .78 | ...... | ...... | .99 |

NOTE.—The stations represented in the lines for average temperature for the years 1877–90 in Exhibit 9, are the following: Port Austin for 1885, 1888, 1889; Mendon for 1877-82; Nirvana for 1877-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Kalamazoo for 1877-89; Coldwater, Ypsilanti, Woodmere Cemetery (near Detroit), for 1877-79; Otisville for 1878-80, 1882; Niles for 1878-79, 1881; Washington for 1879-83; Benton Harbor for 1877-78; Petoskey for 1878-79; Parkville for 1881-82; Hillsdale for 1882-84; Winfield for 1881, 1883; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Ionia for 1883-85; Manistique, Swartz Creek, for 1884-85; Mackinaw City for 1884-87; Muskegon, Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877-87; Otsego for 1887-90; Alma for 1890; Gulliver Lake for 1887-90, 1892; Traverse City, Marshall for 1882-92; Rockland for 1891-92; Tecumseh for 1877-85, 1888-89, 1892; Harrisville for 1881-82, 1885-86, 1890-92; Thornville for 1877-92; Lansing for 1879-92; Agricultural College for 1877, 1881-92; Ann Arbor for 1881-92; Birmingham for 1887-92; Albion for 1890-91.

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 9, because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

EXHIBIT 10.—*Comparison of the Average Temperature during the Year and during each Month of the year 1893, with the Annual and with the Monthly Averages for the Year 1892, and with the Averages for the 29 Years, 1864–92. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

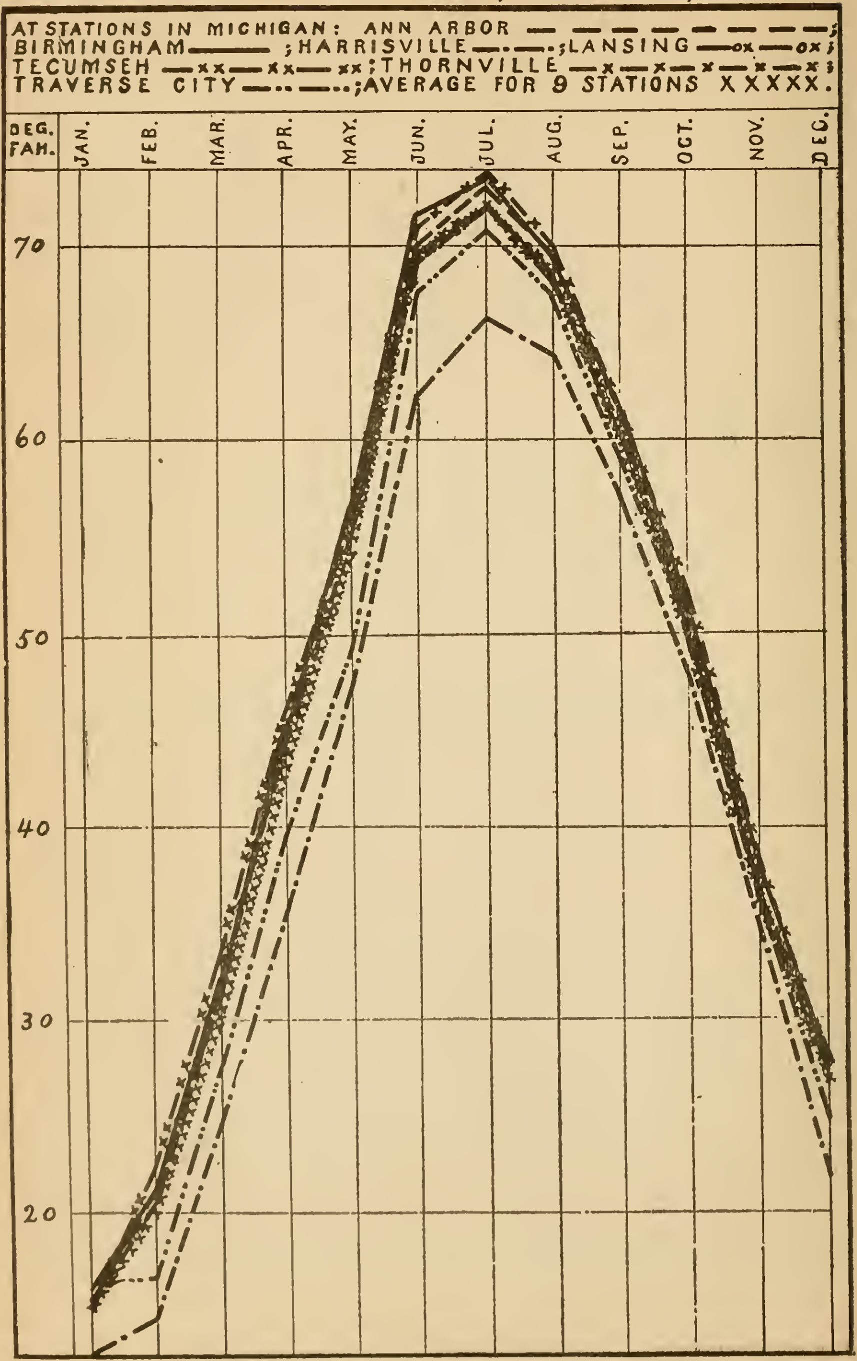
| Years, etc. | Average Temperature—Degrees Fahr. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 29 years, 1864–92 | 46.49 | 21.97 | 24.00 | 30.82 | 45.74 | 57.77 | 67.61 | 71.27 | 68.56 | 60.38 | 48.13 | 35.53 | 26.32 |
| 1892 | 45.88 | 19.19 | 27.30 | 29.86 | 44.50 | 54.50 | 67.70 | 70.29 | 68.30 | 60.80 | 48.30 | 34.20 | 25.59 |
| 1893 | 44.98 | 14.80 | 21.31 | 28.16 | 43.50 | 54.40 | 66.60 | 71.50 | 68.10 | 58.41 | 49.70 | 35.63 | 27.60 |
| In 1893 **Higher** than Av. for 29 years, 1864–92 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | .23 | ...... | ...... | 1.57 | .10 | 1.28 |
| In 1893 **Lower** than Av. for 29 years, 1864–92 | 1.51 | 7.17 | 2.69 | 2.66 | 2.24 | 3.37 | 1.01 | ...... | .46 | 1.97 | ...... | ...... | ...... |
| In 1893 **Higher** than in 1892 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 1.21 | ...... | ...... | 1.40 | 1.43 | 2.01 |
| In 1893 **Lower** than in 1892 | .90 | 4.39 | 5.99 | 1.70 | 1.00 | .10 | 1.10 | ...... | .20 | 2.39 | ...... | ...... | ...... |

EXHIBIT 11.—*Average Temperature* by Year and Months, for the 14 years, 1879–92. Observations made at Office State Board of Health, State Capitol, Lansing, Michigan,*

| Years, etc. | Average Temperature—Degrees Fahr. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 14 years, 1879–92 | 47.23 | 22.27 | 24.67 | 30.82 | 46.08 | 57.95 | 67.73 | 71.96 | 68.61 | 61.60 | 50.00 | 36.82 | 28.28 |
| 1892 | 46.33 | 19.94 | 27.91 | 30.15 | 44.68 | 54.91 | 68.22 | 71.41 | 68.59 | 61.43 | 49.27 | 34.11 | 25.34 |
| 1893 | 46.03 | 15.09 | 20.68 | 32.19 | 43.98 | 55.20 | 69.14 | 72.14 | 68.47 | 60.22 | 51.19 | 36.40 | 27.70 |
| In 1893 **Higher** than Av. for 14 years, 1879–92 | ...... | ...... | ...... | 1.37 | ...... | ...... | 1.41 | .18 | ...... | ...... | 1.19 | ...... | ...... |
| In 1893 **Lower** than Av. for 14 years, 1879–92 | 1.20 | 7.18 | 3.99 | ...... | 2.10 | 2.75 | ...... | ...... | .14 | 1.38 | ...... | .42 | .58 |
| In 1893 **Higher** than in 1892 | ...... | ...... | ...... | 2.04 | ...... | .29 | .92 | .73 | ...... | ...... | 1.92 | 2.29 | 2.36 |
| In 1893 **Lower** than in 1892 | .30 | 4.85 | 7.23 | ...... | .70 | ...... | ...... | ...... | .12 | 1.21 | ...... | ...... | ...... |

* Beginning with the year 1885, slight allowance should be made for Lansing in Exhibit 11, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

DIAGRAM I.— AVERAGE TEMPERATURE, BY MONTHS, 1893.



[Plate 743.]

TABLE I.—*Average temperature in Degrees Fahr., for the Year, and for each Month of the Year 1893, at each of 9 stations in Michigan, and also average lines for 9 stations. From observations made daily at 7 A. M., 2 P. M. and 9 P. M.,* local time, by observers† for the State Board of Health.*

| Stations in Michigan,† | Divisions of the State. ‡‡ | Temperature in Degrees Fahr. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year. | | Months,†† 1893. | | | | | | | | | | | |
| | | Norm. ** | 1893. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
| Av. for 9 stations § | -------- | ------ | 45.64 | 15.23 | 20.09 | 30.61 | 43.19 | 54.30 | 69.05 | 72.16 | 68.57 | 60.40 | 50.59 | 36.61 | 26.88 |
| Rockland | U. P. | ------ | ¶ | [i] 5.08 | [g] 8.57 | [a] 23.22 | [e] 33.95 | ----- | [b] 68.82 | [e] 68.80 | [j] 66.56 | [h] 57.32 | [e] 45.57 | [d] 29.32 | [f] 13.74 |
| Traverse City | N. W. | $43.69^{11}$ | 43.76 | 16.29 | 16.63 | 27.45 | [b] 39.72 | 49.26 | 67.60 | 70.82 | 67.30 | 59.02 | 50.15 | 36.03 | 24.84 |
| Harrisville | N. E. | $44.43^{5}$ | 40.76 | 12.57 | 14.69 | 24.77 | 35.72 | 47.33 | 62.33 | 66.18 | 64.29 | 57.06 | 47.84 | 34.53 | 21.77 |
| Ashton | N. C. | ------ | ‖ | 15.01 | 17.25 | 28.02 | 39.72 | 51.42 | 67.63 | 69.13 | 66.33 | 59.63 | 50.09 | 34.88 | ----- |
| Thornville | B. & E. | $47.78^{17}$ | 46.99 | 16.09 | 20.58 | 31.76 | 44.53 | 56.43 | 71.00 | 73.94 | 70.05 | 61.60 | 52.23 | 38.17 | 27.49 |
| Agr'l College | C. | $46.44^{30}$ | 44.93 | 14.80 | 21.31 | 28.16 | 43.50 | 54.40 | 66.60 | 71.50 | 68.10 | 58.41 | 49.70 | 35.63 | 27.60 |
| Lansing, S. B. of H.‡ | C. | $47.15^{15}$ | 46.03 | 15.09 | 20.68 | 32.19 | 43.98 | 55.20 | 69.14 | 72.14 | 68.47 | 60.22 | 51.19 | 36.40 | 27.70 |
| Albion | S. C. | ------ | ¶¶ | 17.50 | 24.30 | 34.50 | 45.60 | 54.30 | 69.90 | 73.50 | 70.40 | ----- | 51.50 | 37.20 | 27.80 |
| Ann Arbor | S. C. | $46.66^{13}$ | 46.50 | 15.40 | 21.40 | 31.10 | 44.70 | 55.80 | 70.20 | 73.10 | 69.70 | 61.60 | 50.40 | 36.74 | 27.80 |
| Battle Creek | S. C. | $49.08^{3}$ | 48.27 | 15.82 | 21.92 | 34.24 | 45.99 | 57.92 | 73.24 | 76.16 | 71.80 | 62.52 | 52.49 | 37.78 | 29.41 |
| Marshall | S. C. | ------ | ‖‖ | 14.60 | 21.51 | 33.42 | 44.91 | 55.76 | 70.38 | 73.37 | 69.88 | 61.71 | 50.24 | ----- | ----- |
| Tecumseh | S. C. | $46.88^{2}$ | 46.40 | 15.04 | 22.31 | 33.59 | 45.79 | 55.91 | 69.73 | 72.04 | 68.02 | 61.53 | 49.68 | 36.01 | 27.14 |
| Birmingham | S. E. | $47.32^{7}$ | 47 08 | [a] 15.93 | 21.31 | 32.18 | [b] 44.80 | [c] 56.49 | [d] 71.63 | [a] 73.53 | [b] 69.43 | [b] 61.67 | [a] 51.66 | 38.20 | [a] 28.13 |

* The daily averages are one-third the sum of these three observations.

† The names of observers, their place of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

§ This line is an average for only the 9 stations from which statements nearly complete were received for every month of the year. It does not include Ashton, Albion, Marshall and Rockland.

** Numbers in this column state the average annual temperature for periods of years ending in each case with December 31, 1892. The small figures above and at the right of numbers which state the temperature, denote the number of years included in the average.

†† The computations of Av. Temp., as tabulated for months in 1893 were made at the following stations: Albion and Ann Arbor. All other computations in Table I. were made at the office of the State Board of Health.

‡ Beginning with the year 1885, allowance must be made for Lansing in Table I., because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit A, on page 22, Report for 1886.

‡‡ The names of divisions, and the counties in each, are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

¶ The average for 11 months is 38.27.

¶¶ The average for 11 months is 46.05.

‖ For 11 months, 45.37.

‖‖ The average for 10 months, is 49.58.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 26 days. e For 25 days. f For 24 days. g For 23 days h For 22 days. i For 2[illegible] days. j For 19 days.

The average line and lines for 7 representative stations in Table I. are graphically represented in Diagram I., page 20.

TABLE II.—*Extremes of Temperature and Days of Month on which the Highest and Range for the Year 1893, at each of 20 Stations in Michigan.—As indicated by daily 2 P. M. and 9 P. M., by Observers* for the State Board of Health, and for the U. S.*

| Line Number. | Stations in Michigan.* (Those of the U. S. Weather Bureau in Italics.) | Year, 1893. | | | January. | | February. | | March. | | April. | | May. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Highest. | Lowest. | Range. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. |
| 1 | At 15 Stations †.... | 97 | -26 | 123 | 49 | -26 | 44 | -23 | 66 | -6 | 80 | 9 | 88 | 27 |
| 2 | Rockland ‡........ | .... | .... | .... | $35^{20}$ | $-18^{14}$ | $50^{13}$ | $-25^{2, 4}$ | $61^{7}$ | $-6^{15}$ | $64^{10}$ | $11^{15}$ | ........ | .... |
| 3 | *Marquette* §........ | 95 | -19 | 114 | $35^{22}$ | $-15^{14}$ | $42^{13}$ | $-19^{2}$ | $47^{29}$ | $-4^{18}$ | $60^{12}$ | $16^{6}$ | $73^{10, 19}$ | $30^{7}$ |
| 4 | *Sault Ste. Marie* §.. | 92 | -26 | 118 | $31^{23}$ | $-26^{10}$ | $36^{13, 14}$ | $-23^{4}$ | $48^{9}$ | $-5^{18}$ | $62^{12}$ | $9^{2, 6}$ | $77^{20}$ | $30^{4}$ |
| 5 | *Manistee* §.......... | .... | .... | .... | $37^{29}$ | $-4^{27}$ | $40^{13, 27}$ | $-3^{4}$ | $60^{31}$ | $0^{16}$ | $76^{7}$ | $20^{2}$ | $75^{19, 22, 31}$ | $34^{4, 5, 7}$ |
| 6 | Traverse City ‡.... | 96 | -14 | 110 | $35^{22}$ | $-6^{14}$ | $43^{14}$ | $-14^{3}$ | $56^{31}$ | $-6^{15}$ | $75^{7}$ | $14^{1}$ | $84^{11}$ | $27^{4}$ |
| 7 | *Alpena* §........... | 93 | -14 | 107 | $43^{29}$ | $-10^{10}$ | $40^{28}$ | $-14^{20}$ | $56^{24}$ | $0^{15}$ | $74^{12}$ | $16^{2}$ | $86^{20}$ | $31^{26}$ |
| 8 | Harrisville ‡....... | 96 | -21 | 117 | $40^{28}$ | $-19^{9}$ | $38^{14}$ | $-21^{3}$ | $54^{24}$ | $-4^{14, 15}$ | $61^{7, 12}$ | $15^{1}$ | $86^{20}$ | $28^{8, 25}$ |
| 9 | *Grand Haven* §.... | 89 | -2 | 91 | $48^{28}$ | $0^{10, 15, 27}$ | $44^{27}$ | $-2^{20}$ | $64^{31}$ | $9^{16}$ | $68^{7}$ | $24^{2}$ | $78^{31}$ | $34^{6}$ |
| 10 | Ashton ‡........... | .... | .... | .... | $36^{28}$ | $-17^{14}$ | $43^{23}$ | $-31^{20}$ | $48^{31}$ | $-5^{18}$ | $70^{7}$ | $18^{2}$ | $76^{11, 20}$ | $26^{5}$ |
| 11 | *Port Huron* § ..... | 92 | -11 | 103 | $44^{28}$ | $-11^{10, 11}$ | $41^{28}$ | $-6^{20}$ | $62^{24}$ | $6^{5}$ | $74^{7}$ | $22^{2}$ | $84^{20}$ | $34^{5}$ |
| 12 | Thornville ‡ ....... | 97 | -14 | 111 | $45^{28}$ | $-14^{10}$ | $40^{14, 28}$ | $-8^{20}$ | $54^{24}$ | $6^{16}$ | $74^{12}$ | $22^{2}$ | $85^{22}$ | $37^{8}$ |
| 13 | Agr'l College ‡. ... | 95 | -16 | 111 | $45^{28}$ | $-16^{14}$ | $43^{13}$ | $-10^{19}$ | $63^{31}$ | $5^{15}$ | $76^{7}$ | $21^{1}$ | $83^{20, 22}$ | $33^{5}$ |
| 14 | Lansing, S. B. of H.‡ ¶.......... | 94 | -11 | 105 | $44^{28}$ | $-11^{10}$ | $40^{14, 27}$ | $-7^{19, 20}$ | $63^{31}$ | $6^{15}$ | $77^{7}$ | $22^{1}$ | $83^{20, 22}$ | $34^{5}$ |
| 15 | Albion ‡........... | .... | .... | .... | $45^{28}$ | $-14^{15}$ | $43^{14}$ | $-3^{19}$ | $61^{31}$ | $10^{15}$ | $76^{7}$ | $26^{1}$ | $83^{23}$ | $35^{5}$ |
| 16 | Ann Arbor ‖....... | 92 | -11 | 103 | $45^{28}$ | $-11^{15}$ | $41^{6}$ | $-8^{20}$ | $57^{23}$ | $7^{4}$ | $78^{7}$ | $23^{2}$ | $82^{20}$ | $86^{5}$ |
| 17 | Kalamazoo §....... | 94 | -10 | 104 | $44^{28}$ | $-10^{15}$ | $44^{27, 28}$ | $-3^{20}$ | $65^{31}$ | $11^{4, 15}$ | $79^{7}$ | $27^{2}$ | $84^{22}$ | $34^{6}$ |
| 18 | Marshall ‡......... | .... | .... | .... | $43^{28, 29}$ | $-12^{14}$ | $40^{15}$ | $-9^{20}$ | $64^{31}$ | $4^{16}$ | $78^{7}$ | $22^{2, 27}$ | $87^{20, 22}$ | $32^{6}$ |
| 19 | Tecumseh ‡........ | 90 | -15 | 105 | $49^{29}$ | $-15^{15}$ | $42^{7}$ | $-6^{20}$ | $58^{31}$ | $9^{16}$ | $80^{8}$ | $23^{2}$ | $86^{21, 23}$ | $35^{3}$ |
| 20 | Birmingham ‡..... | 96 | -13 | 109 | $47^{28}$ | $-13^{10, 14}$ | $43^{6}$ | $-5^{19, 20}$ | $62^{23}$ | $8^{3}$ | $77^{7}$ | $23^{1}$ | $88^{22}$ | $30^{23}$ |
| 21 | *Detroit* §........... | 93 | -10 | 103 | $46^{29}$ | $-10^{15}$ | $42^{6}$ | $-6^{20}$ | $66^{23}$ | $9^{16}$ | $76^{7}$ | $26^{2, 15}$ | $85^{20}$ | $37^{7}$ |

NOTE.—The small figures above and at the right of numbers denoting the degrees of temperature, state the day or days of the month on which the highest or the lowest temperature occurred.

* The names of observers, etc., are stated in Exhibit 1, page 2.

† The line No. 1, and the three columns for the year 1893, relate only to the 15 stations from which observations were received for every month of the year. It does not include Ashton, Albion, Rockland, Manistee and Marshall.

‡ For stations marked thus ‡, the daily readings of registering thermometers were recorded at 7 A. M. for the preceding calendar day.

§ At the stations of the U. S. Weather Bureau and at Kalamazoo, the maximum thermometer was read and recorded at 8:00 A. M., and the minimum at 8:00 P. M., 75th meridian time. The local time at these stations corresponding to 8:00 A. M. and 8:00 P. M., 75th meridian time, is as follows: at Port Huron, 7:30 A. M. and 7:30 P. M.; at Detroit, 7:28 A. M. and 7:28 P. M.; at Alpena, 7:26 A. M. and 7:26 P. M.; at Grand Haven, 7:15 A. M. and 7:15 P. M.; at Marquette, 7:11 A. M. and 7:11 P. M.; at Manistee, 7:15 A. M. and 7:15 P. M.; at Sault Ste. Marie, 7:23 A. M. and 7:23 P. M.; at Kalamazoo, 7:18 A. M. and 7:18 P. M.

‖ At Ann Arbor the registering thermometers were read and recorded at 9 P. M.

¶ Beginning with the year 1885 allowance must be made for Lansing in Table II, because of a change in the location of the instruments. The amount of the variation by months is shown in Exhibit B, on page 22, Report for 1886.

*the Lowest Temperature occurred by Months of the year 1893; also, Extremes and Readings of Registering Thermometers, or by Observations made daily at 7 A. M., Weather Bureau.*

| June. | | July. | | August. | | September. | | October. | | November. | | December. | | Line Number. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | Highest. | Lowest. | |
| 96 | 36 | 98 | 43 | 97 | 38 | 89 | 22 | 84 | 22 | 68 | 6 | 62 | -14 | 1 |
| $98^{13}$ | $41^{6}$ | $97^{12}$ | $45^{3}$ | $96^{8}$ | $41^{30}$ | $89^{9}$ | $27^{28}$ | $89^{10}$ | $18^{30}$ | $75^{1}$ | $2^{30}$ | $48^{22}$ | $-5^{1}$ | 2 |
| $95^{19}$ | $36^{11}$ | $91^{21}$ | $48^{5}$ | $92^{9}$ | $45^{6}$ | $81^{9}$ | $34^{30}$ | $69^{22, 23}$ | $23^{29}$ | $65^{7}$ | $8^{30}$ | $46^{23}$ | $2^{1, 4, 30}$ | 3 |
| $92^{20}$ | $36^{7}$ | $84^{21}$ | $44^{4, 6}$ | $90^{10}$ | $42^{13, 29}$ | $76^{14}$ | $32^{29}$ | $76^{14}$ | $32^{30}$ | $62^{7}$ | $10^{25}$ | $38^{23}$ | $-14^{30}$ | 4 |
| $85^{20}$ | $43^{11}$ | $88^{24}$ | $50^{11}$ | $90^{10}$ | $43^{8}$ | -------- | -------- | -------- | ------ | ------ | ------ | ------ | ------ | 5 |
| $96^{19}$ | $41^{10}$ | $95^{12}$ | $47^{26}$ | $96^{9, 10}$ | $42^{6}$ | $83^{14, 18}$ | $32^{29}$ | $80^{11}$ | $27^{28}$ | $65^{1, 7}$ | $25^{10}$ | $46^{23}$ | $5^{29}$ | 6 |
| $92^{19}$ | $41^{7}$ | $93^{25}$ | $47^{11}$ | $92^{10}$ | $42^{14}$ | $79^{14}$ | $30^{29}$ | $71^{8}$ | $24^{30}$ | $59^{1}$ | $17^{26, 30}$ | $49^{23}$ | $6^{4, 30}$ | 7 |
| $91^{19}$ | $37^{6}$ | $96^{25}$ | $43^{9}$ | $93^{4}$ | $41^{13}$ | $80^{14}$ | $31^{25}$ | $70^{12}$ | $22^{29}$ | $58^{8}$ | $12^{30}$ | $50^{23}$ | $1^{3}$ | 8 |
| $88^{30}$ | $45^{11}$ | $87^{14, 25}$ | $51^{4}$ | $89^{10}$ | $42^{30, 31}$ | $85^{10, 21}$ | $33^{28}$ | $79^{10}$ | $29^{25, 30}$ | $61^{1}$ | $13^{26}$ | $56^{24}$ | $10^{2}$ | 9 |
| $90^{18, 19, 20, 21}$ | $42^{25}$ | $87^{25}$ | $41^{4}$ | $90^{10}$ | $35^{30, 31}$ | $81^{4}$ | $22^{29}$ | $75^{12}$ | $23^{16, 25}$ | $59^{1}$ | $5^{26}$ | ----- | ------ | 10 |
| $92^{20}$ | $45^{7}$ | $92^{12, 25}$ | $50^{4}$ | $92^{5}$ | $45^{30}$ | $84^{4, 14, 19}$ | $33^{26}$ | $82^{12}$ | $24^{30}$ | $63^{7}$ | $16^{20}$ | $58^{25}$ | $5^{2, 4, 20}$ | 11 |
| $93^{20}$ | $51^{7}$ | $93^{12, 13, 25}$ | $54^{27}$ | $97^{10}$ | $46^{7}$ | $89^{14}$ | $31^{29}$ | $82^{12}$ | $29^{30}$ | $64^{2}$ | $13^{26}$ | $60^{24, 25}$ | $-1^{4}$ | 12 |
| $90^{19, 20}$ | $51^{11}$ | $92^{13}$ | $46^{3, 4}$ | $95^{10}$ | $38^{29}$ | $84^{4}$ | $22^{28}$ | $84^{12}$ | $22^{15}$ | $65^{7}$ | $6^{15}$ | $62^{24}$ | $-8^{3, 12}$ | 13 |
| $89^{20}$ | $50^{6}$ | $92^{25}$ | $48^{3}$ | $94^{10}$ | $42^{29}$ | $87^{4}$ | $27^{28}$ | $81^{12}$ | $26^{15, 29}$ | $68^{8}$ | $12^{30}$ | $59^{24}$ | $4^{12}$ | 14 |
| $90^{19}$ | $51^{18}$ | $91^{13}$ | $50^{3}$ | $91^{10}$ | $43^{29}$ | -------- | -------- | $79^{12}$ | $26^{29}$ | $61^{1}$ | $12^{25}$ | $63^{24}$ | $6^{12}$ | 15 |
| $87^{19}$ | $49^{7}$ | $90^{13}$ | $51^{4}$ | $92^{10}$ | $45^{30}$ | $86^{5}$ | $30^{29}$ | $77^{12}$ | $26^{30}$ | $61^{8}$ | $14^{26}$ | $58^{25}$ | $4^{13}$ | 16 |
| $89^{19}$ | $53^{6}$ | $93^{24}$ | $50^{4}$ | $94^{10}$ | $48^{31}$ | $89^{14}$ | $35^{29}$ | $80^{12}$ | $29^{29, 30}$ | $63^{6}$ | $12^{25}$ | $61^{24}$ | $4^{2}$ | 17 |
| $97^{19}$ | $47^{7}$ | $94^{24}$ | $46^{4}$ | $96^{10}$ | $40^{30}$ | $89^{5}$ | $29^{29}$ | $82^{12}$ | $23^{30}$ | ----- | ----- | ------ | ------ | 18 |
| $85^{21}$ | $46^{7}$ | $90^{26}$ | $50^{4}$ | $89^{6}$ | $41^{31}$ | $89^{6}$ | $29^{25, 28}$ | $79^{12}$ | $23^{29}$ | $62^{2}$ | $11^{30}$ | $59^{24, 25}$ | $-3^{12}$ | 19 |
| $95^{19}$ | $48^{6}$ | $96^{26}$ | $49^{3}$ | $93^{5, 10}$ | $47^{7}$ | $89^{19}$ | $30^{25}$ | $79^{12}$ | $25^{29}$ | $64^{5}$ | $13^{25}$ | $59^{25}$ | $0^{19}$ | 20 |
| $89^{20}$ | $51^{7}$ | $93^{25}$ | $55^{27}$ | $92^{5}$ | $52^{7}$ | $87^{4}$ | $34^{26, 29}$ | $81^{12}$ | $26^{30}$ | $62^{7, 8}$ | $19^{26}$ | $60^{25}$ | $6^{2}$ | 21 |

The average daily range of temperature at from 6 to 19 stations per year, by months, for a period of 14 years, 1879-92, and a comparison of 1892 with the monthly averages for that period and for 1892, are given in Exhibit 13, page 24. The highest and lowest temperatures in every month in 1893, at each of 15 stations, are stated in Table II., pages 22 and 23. The average daily range of temperature by months in 1893, at each of 20 stations, and the average for 15 of the stations, are stated in Table III., page 26. The lines for 7 of these stations, and the average line for 15 of the stations, are represented in Diagram II., page 27. It will be noticed that the greatest average daily range occurred during the month of August.

EXHIBIT 12.—*Average Temperature in Degrees Fah., for the year and months, 1893, at Office State Board of Health, State Capitol, Lansing, Michigan, computed from readings at 7 A. M., 2 P. M. and 9 P. M., daily, from registers of the Draper Self-Recording Thermometer, compared with observations made with Green's standard mercurial Thermometer at the same hours; both thermometers placed in double latticed shelter for instruments, in southwest part of Capitol yard.*

| Tri-daily readings of instruments specified. | Year. | Average Temperature, in Degrees Fahr.—Year and Months, 1893. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. Temp. from tri-daily observations with Green's Standard Mercurial Thermometer | 46.03 | 15.09 | 20.68 | 32.19 | 43.98 | 55.20 | 69.14 | 72.14 | 68.47 | 60.22 | 51.19 | 36.40 | 27.70 |
| Av. Temp. computed from readings of the Draper's Self-Recording Thermometer | 45.64 | 16.90 | 21.53 | 32.76 | 43.62 | 54.05 | 67.39 | 70.10 | 66.86 | 59.24 | 50.54 | 36.32 | 28.31 |
| Higher (+) by Draper's than by Green's Thermometer | ...... | 1.81 | .85 | .57 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | .61 |
| Lower (−) by Draper's than by Green's Thermometer | .39 | ...... | ...... | ...... | .36 | 1.15 | 1.75 | 2.04 | 1.61 | .98 | .65 | .08 | ...... |

EXHIBIT 13.—*Average Daily Range of Temperature, by Year and Months in 1893, compared with Annual and Monthly Averages for 1892, and for the 14 years, 1879-1892. These Averages are for Groups of Several Stations in Michigan.**

| Years, etc. | Average Daily Range of Temperature—Degrees Fahr. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 14 years, 1879-92. | 18.01 | 15.90 | 17.27 | 17.47 | 19.40 | 20.35 | 20.30 | 20.89 | 20.08 | 20.01 | 17.18 | 14.11 | 13.19 |
| 1892 (19 stations) | 17.15 | 16.62 | 14.06 | 17.16 | 19.12 | 17.22 | 18.52 | 22.02 | 19.93 | 20.14 | 18.14 | 11.60 | 11.27 |
| 1893 (15 stations) | 17.92 | 15.05 | 18.20 | 16.64 | 16.32 | 19.20 | 20.52 | 20.75 | 22.12 | 20.36 | 17.27 | 14.28 | 14.31 |
| In 1893 Greater than Av. for 14 years, 1879-92. | ...... | ...... | .93 | ...... | ...... | ...... | .22 | ...... | 2.04 | .35 | .09 | .17 | 1.12 |
| In 1893 Less than Av. for 14 years, 1879-92. | .09 | .85 | ...... | .83 | 3.08 | 1.15 | ...... | .14 | ...... | ...... | ...... | ...... | ...... |
| In 1893 Greater than in 1892. | .77 | ...... | 4.14 | ...... | ...... | 1.98 | 2.00 | ...... | 2.19 | .22 | ...... | 2.68 | 3.04 |
| In 1893 Less than in 1892 | ...... | 1.57 | ...... | .52 | 2.80 | ...... | ...... | 1.27 | ...... | ...... | .87 | ...... | ...... |

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* Otisville for 1879-80, 1882; Escanaba for 1880-87; Adrian for 1880; Reed City for 1882, 1884-85; Washington for 1882-88; Winfield for 1888; Manistique, Ionia, Swartz Creek for 1881-85; Mackinaw City for 1884-87; Hillsdale for 1884; Pentwater, East Saginaw, Hudson for 1886; Port Austin for 1888-89; Gulliver Lake for 1887-90, 1892; Alma, Otsego for 1890; Tecumseh for 1883-85, 1892; Marquette for 1879-84, 1886-92; Battle Creek for 1879-80, 1888-89, 1891; Grand Haven for 1879-88, 1890-92; Alpena, Port Huron, Thornville for 1880-92; Detroit, Lansing for 1879-92; Kalamazoo for 1880-83, 1886-90, 1892; Agricultural College for 1881-92; Traverse City, Marshall for 1882-92; Harrisville for 1882, 1885-92; Ann Arbor for 1882-83, 1885-92; Birmingham for 1887, 1889-92; Manistee for 1889-92; Albion for 1890-91; Rockland for 1891-92; Sault Ste. Marie for 1892.

EXHIBIT 14.—*Comparisons of the Average Daily Range of Temperature for the Year and for each Month of the Year 1893, with Averages for the 19 Years, 1874–92, and for the Year 1892. Observations made with Registering Thermometers by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

| Years, etc. | Average Daily Range of Temperature—Degrees Fahr. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 19 years, 1874-92* | 20.74 | 11.51 | 18.68 | 18.95 | 22.42 | 23.54 | 22.50 | 24.62 | 25.23 | 24.38 | 20.70 | 16.05 | 14.99 |
| 1892 | 19.47 | 20.77 | 16.94 | 19.10 | 22.16 | 17.48 | 16.67 | 23.25 | 20.87 | 23.03 | 23.34 | 16.20 | 13.84 |
| 1893 | 21.74 | 17.23 | 19.30 | 19.70 | 16.10 | 18.80 | 21.90 | 25.90 | 29.80 | 29.10 | 23.90 | 20.60 | 18.60 |
| In 1893 Greater than Av. for 19 years, 1874-92 | 1.00 | 5.72 | .62 | .75 | ------ | ------ | ------ | 1.28 | 4.57 | 4.72 | 3.20 | 4.55 | 3.61 |
| In 1893 Less than Av. for 19 years, 1874-92 | -------- | ------ | ------ | ------ | 6.32 | 4.74 | .60 | ------ | ------ | ------ | ------ | ------ | ------ |
| In 1893 Greater than in 1892 | 2.27 | ------ | 2.36 | .60 | ------ | 1.32 | 5.23 | 2.65 | 8.93 | 6.07 | .56 | 4.40 | 4.76 |
| In 1893 Less than in 1892 | -------- | 3.54 | ------ | ------ | 6.06 | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ |

* For the years 1874–6, 1878, 1879 (except Nov. and Dec.), and 1880, the computations were made from the report of observations published in the Reports of the State Board of Agriculture for those years. For 1877, 1881 (except Jan.), 1882–93, the computations were made from registers or copies of registers supplied by Dr. Kedzie.

The average annual and monthly temperature at from 11 to 22 stations for a period of 16 years, 1877–92, is stated in Exhibit 9, page 18, in which is also given, by months, a comparison of 1893 with the average for 1892, and with the averages for the 16 years, 1877–92. By Exhibit 9, page 18, which gives averages for groups of several stations in Michigan, it appears that in 1893 the mean temperature in January, February, August and September was lower than in those months in 1892. It also appears that March, June, July, August, October, and November were warmer than the average temperature of the corresponding months for the 16 years, 1877–92.

By Exhibit 16, page 29 it appears that, at the Agricultural College, the lowest temperature reached in June, 1893, was above the average lowest temperature for the corresponding month in the preceding 20 years, and that in the month of February, 1893, the range of temperature was considerably less than the average range of temperature for the corresponding month in the 20 preceding years, and also the highest temperature for 1893 was the same as the average highest temperature for the preceding 20 years, and the lowest temperature was above the average lowest temperature for those years. The highest and lowest temperatures at the Agricultural College, in every month of the 7 years, 1887–93, and comparisons of months in 1893, with the average highest and lowest temperatures by months for the preceding 20 years, are stated in Exhibit 16.

TABLE III.—*Average Daily Range of Temperature, by Registering Thermometers during the Year and during each Month of the Year 1893, at each of 15 Stations in Michigan, and Average for 15 Stations.*

| Stations in Michigan.* (Those of the U. S. Weather Bureau in Italics.) | Divisions of the State † | Norm. ‡ | Average Daily Range of Temperature—Degrees Fahr. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Year, 1893. | Months, 1893. | | | | | | | | | | | |
| | | | | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. for 15 stations § | -------- | ------ | 17.92 | 15.05 | 18.20 | 16.64 | 16.32 | 19.20 | 20.52 | 20.75 | 22.12 | 20.36 | 17.27 | 14.28 | 14.31 |
| Rockland | U. P. | ------ | ‖ | [f] 18.16 | [d] 24.96 | [a] 26.16 | [e] 24.16 | ----- | 27.00 | [b] 23.87 | [e] 26.96 | [c] 25.68 | 23.19 | 19.53 | [g] 19.37 |
| *Marquette* | U. P. | $15.31^{8}$ | 14.89 | 9.00 | 18.40 | 15.10 | 12.90 | 14.70 | 19.70 | 18.10 | 17.60 | 15.13 | 13.50 | 13.00 | 11.50 |
| *Sault Ste. Marie* | U. P. | $16.75^{2}$ | 16.98 | 14.20 | 18.20 | 17.90 | 15.10 | 19.00 | 24.70 | 20.20 | 20.40 | 15.00 | 15.00 | 10.40 | 13.60 |
| *Manistee* | N. W. | ------ | ¶ | 6.55 | 14.64 | 13.65 | 18.20 | 15.97 | 17.83 | 15.58 | 16.29 | ----- | ----- | ----- | ----- |
| Traverse City | N. W. | $19.67^{12}$ | 20.53 | 16.00 | 23.50 | 19.10 | 18.83 | 23.64 | 24.80 | 24.16 | 24.67 | 22.87 | 18.26 | 16.80 | 13.68 |
| *Alpena* | N. E. | $15.78^{14}$ | 16.44 | 14.61 | 19.64 | 15.77 | 14.90 | 17.61 | 20.70 | 19.39 | 21.16 | 17.57 | 13.39 | 10.77 | 11.77 |
| Harrisville | N. E. | $20.23^{9}$ | 20.11 | 21.00 | 25.42 | 18.94 | 16.00 | 20.87 | 21.90 | 22.55 | 22.22 | 20.37 | 17.29 | 16.57 | 18.19 |
| Grand Haven | W. | $14.70^{4}$ | 15.49 | 12.70 | 15.00 | 14.10 | 14.20 | 17.50 | 17.50 | 16.80 | 19.40 | 18.60 | 15.30 | 12.50 | 12.80 |
| Ashton | N. C. | ------ | ‖‖ | 17.64 | 21.22 | 19.06 | 19.73 | 25.87 | 25.57 | 24.87 | 29.16 | 24.53 | 21.51 | 16.70 | ----- |
| *Port Huron* | B. & E. | $15.79^{14}$ | 16.08 | 14.00 | 14.43 | 14.84 | 15.20 | 17.90 | 17.97 | 19.55 | 19.81 | 18.73 | 16.32 | 11.80 | 12.45 |
| Thornville | B. & E. | $23\ 60^{14}$ | 17.43 | 14.90 | 16.04 | 14.29 | 16.00 | 19.58 | 21.47 | 20.84 | 22.77 | 21.43 | 17.42 | 12.47 | 12.00 |
| Agricultural College | C. | $20.25^{12}$ | 21.74 | 17.23 | 19.30 | 19.70 | 16.10 | 18.80 | 21.90 | 25.90 | 29.80 | 29.10 | 23.90 | 20.60 | 18.60 |
| Lansing, S. B. of H. | C. | $19.46^{15}$ | 19.12 | 14.71 | 17.43 | 16.45 | 17.43 | 19.55 | 19.33 | 23.10 | 25.87 | 25.13 | 20.74 | 16.03 | 13.64 |
| Albion | S. C. | ------ | §§ | 19.30 | 18.40 | 16.60 | 16.60 | [e] 20.96 | 20.30 | 20.70 | 23.60 | ----- | 19.90 | 16.60 | 17.35 |
| Ann Arbor | S. C. | $17.91^{12}$ | 17.84 | 14.80 | 16.60 | 15.00 | 16.82 | 18.31 | 20.63 | 19.62 | 22.14 | 20.78 | 18.02 | 14.77 | 16.60 |
| Kalamazoo | S. C. | $15.95^{2}$ | 16.71 | 14.55 | 15.34 | 15.64 | 15.87 | 18.52 | 16.68 | 17.78 | 19.54 | 18.38 | 17.35 | 15.42 | 15.50 |
| Marshall | S. C. | ------ | ¶¶ | 15.48 | 16.71 | 18.68 | 20.47 | 24.62 | 26.17 | 27.07 | 30.48 | 36.43 | 21.93 | ----- | ----- |
| Tecumseh | S. C. | $19.74^{2}$ | 19.69 | 18.03 | 20.18 | 19.49 | 20.76 | 22.29 | 19.40 | 20.38 | 24.16 | 22.17 | 18.10 | 15.73 | 15.58 |
| Birmingham | S. E. | $21.37^{7}$ | 20.30 | 17.65 | 20.25 | 18.62 | [b] 18.75 | 22.09 | 23.57 | 24.45 | 23.62 | 21.53 | 19.77 | 16.77 | 16.55 |
| *Detroit* | S. E. | $15.60^{15}$ | 15.42 | 12.30 | 13.20 | 14.70 | 15.90 | 17.60 | 17.60 | 18.45 | 18.70 | 18.60 | 14.70 | 10.57 | 12.74 |

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

† For counties in each division see Exhibit 1, in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the annual average range of temperature for periods of years ending in each case with December 31, 1893. The small figures above and at the right of numbers which state the range of temperature, denote the number of years included in the average.

§ This line is an average for all stations for which statements nearly complete are given for every month of the year. It does not include the lines for Ashton, Albion, Rockland, Manistee and Marshall.

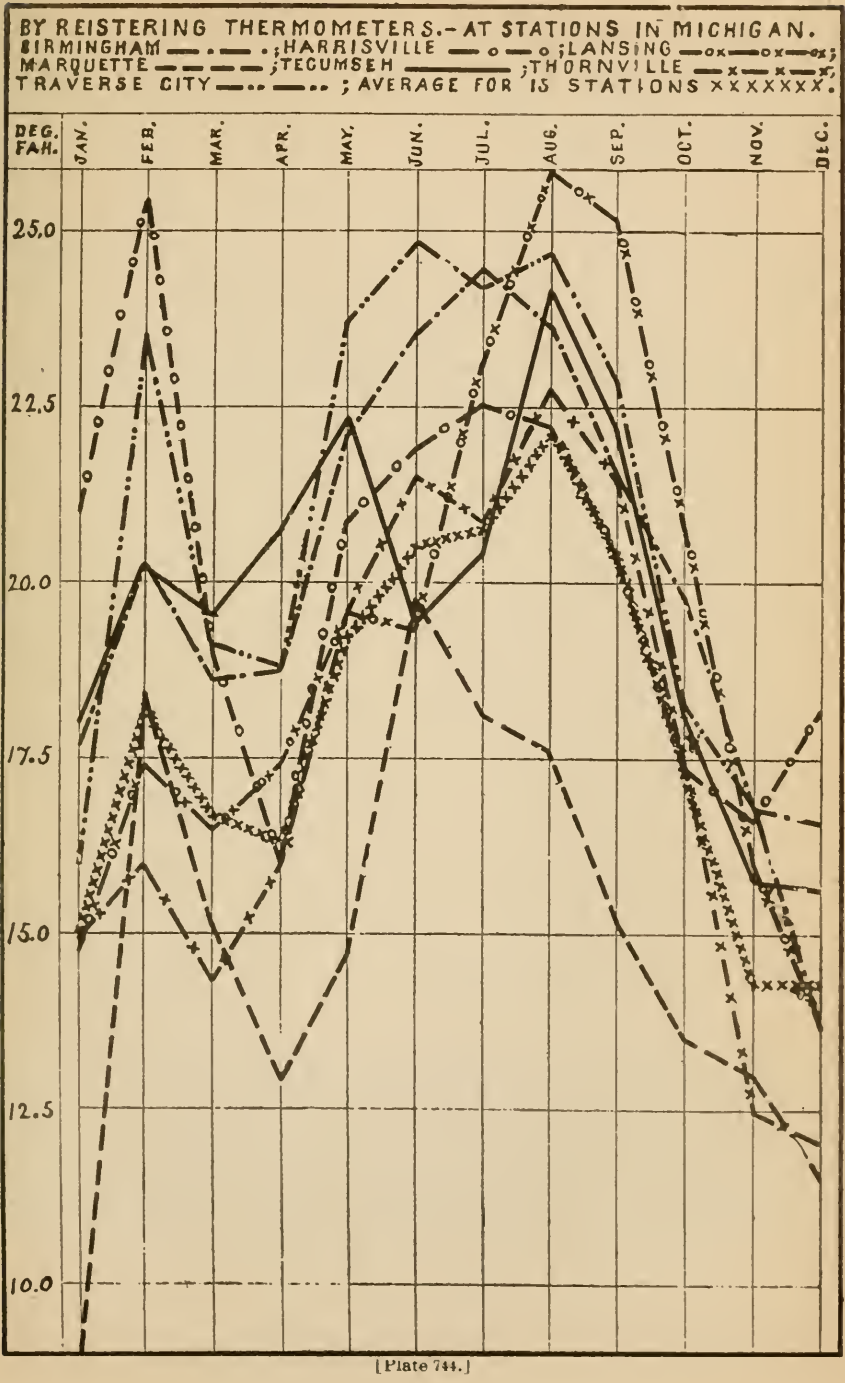
‖ The average for 11 months is 23.55. ¶ For 8 months, 14.84. ‖‖ For 11 months, 22.35. ¶¶ For 10 months, 22.80. §§ For 11 months, 19.12.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f For 25 days. g For 24 days.

NOTE.—Graphic representations of statements in Table III., are given in Diagram II, page 27.

DIAGRAM II.—AV. DAILY RANGE OF TEMP., BY MONTHS, 1893.



[Plate 744.]

EXHIBIT 15.—*Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each Month of the Year, 1893, with the Average of the Extremes, and of the Range, for the sixteen Years 1877–92, also, Statement of the Extremes and of the Range for each of the Seven Years, 1887–93. Observations made with Registering Thermometers by Observers for the State Board of Health, and for the U. S. Weather Bureau. These Comparisons, etc., are for* **Groups of Several Stations in Michigan.**

| Year and Months. | Extremes and ranges of temperature—Degrees Fahrenheit. | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1887. | | | 1888. | | | 1889. | | | 1890. | | | 1891. | | | 1892. | | | Av. for 16 years, 1877–92. | | | 1893.[*] | | | 1893 Higher (+), or Lower (-), than Av. 16 years, 1877–92. | | |
| | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. |
| Year | 104 | -28 | 132 | 99 | -33 | 132 | 97 | -23 | 120 | 100 | -26 | 126 | 100 | -14 | 114 | 102 | -24 | 126 | 100 | -26 | 126 | 97 | -26 | 123 | -3 | = | -3 |
| Av. month | 79 | 10 | 69 | 76 | 9 | 67 | 77 | 14 | 63 | 79 | 10 | 68 | 78 | 14 | 64 | 77 | 12 | 65 | 78 | 11 | 67 | 77 | 11 | 66 | -1 | = | —1 |
| January | 54 | -28 | 82 | 45 | -23 | 68 | 53 | -7 | 60 | 66 | -14 | 80 | 52 | -10 | 62 | 57 | -22 | 79 | 54 | -20 | 74 | 49 | -26 | 75 | -5 | +6 | = |
| February | 55 | -21 | 76 | 49 | -33 | 82 | 49 | -23 | 72 | 63 | -8 | 71 | 55 | -14 | 69 | 52 | -24 | 76 | 56 | -20 | 76 | 44 | -23 | 67 | -12 | +3 | —9 |
| March | 60 | -14 | 74 | 69 | -20 | 89 | 65 | 5 | 60 | 59 | -26 | 85 | 58 | -8 | 66 | 64 | -13 | 77 | 65 | -14 | 79 | 66 | -6 | 72 | +1 | —8 | —7 |
| April | 82 | 8 | 74 | 88 | 6 | 82 | 80 | 14 | 66 | 80 | 1 | 79 | 87 | 10 | 77 | 79 | 13 | 66 | 83 | 8 | 75 | 80 | 9 | 71 | —3 | +1 | —4 |
| May | 97 | 28 | 69 | 84 | 21 | 63 | 95 | 23 | 72 | 91 | 21 | 70 | 85 | 25 | 60 | 85 | 27 | 58 | 89 | 23 | 66 | 88 | 27 | 61 | —1 | +4 | —5 |
| June | 98 | 40 | 58 | 99 | 29 | 70 | 93 | 36 | 57 | 98 | 32 | 66 | 97 | 31 | 66 | 102 | 34 | 68 | 95 | 32 | 63 | 96 | 36 | 60 | +1 | +4 | —3 |
| July | 104 | 39 | 65 | 97 | 40 | 57 | 97 | 36 | 61 | 98 | 39 | 59 | 95 | 37 | 58 | 97 | 41 | 56 | 98 | 40 | 58 | 96 | 43 | 53 | —2 | +3 | —5 |
| August | 98 | 37 | 61 | 94 | 33 | 61 | 94 | 37 | 57 | 100 | 34 | 66 | 100 | 37 | 63 | 95 | 37 | 58 | 97 | 37 | 60 | 97 | 38 | 59 | = | +1 | —1 |
| September | 91 | 26 | 65 | 90 | 28 | 62 | 93 | 25 | 68 | 90 | 27 | 63 | 93 | 85 | 58 | 92 | 30 | 62 | 93 | 29 | 64 | 89 | 22 | 67 | —4 | —7 | +3 |
| October | 80 | 11 | 69 | 78 | 23 | 50 | 76 | 14 | 62 | 80 | 24 | 56 | 87 | 21 | 66 | 82 | 23 | 59 | 84 | 19 | 65 | 84 | 22 | 62 | = | +3 | —3 |
| November | 70 | -6 | 76 | 72 | 8 | 64 | 66 | 11 | 55 | 68 | 0 | 68 | 65 | -3 | 68 | 64 | 5 | 59 | 69 | 1 | 68 | 68 | 6 | 62 | —1 | +5 | —6 |
| December | 56 | -6 | 62 | 55 | 1 | 54 | 65 | 2 | 63 | 50 | -6 | 56 | 60 | 8 | 52 | 58 | -11 | 69 | 57 | -8 | 65 | 62 | -14 | 76 | +5 | +6 | +11 |

[*] For the 17 years, 1877–93, the highest temperature was 105°, at Battle Creek, September 9, 1884; the lowest was -36°, at Manistique, January 27, 1885.

Foot-notes to Exhibit 17:

[*] Beginning with the year 1885, allowance must be made for Lansing in Exhibit 17, because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, on page 23, Report for 1886.

[†] Kalamazoo for 1877-83, 1886-89; Mendon for 1877-82; Otisville for 1878-80, 1882; Niles for 1878-79, 1881; Nirvana for 1878-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Benton Harbor, Coldwater for 1877-78; Washington for 1880-83; Petoskey for 1879; Winfield for 1881, 1883; Woodmere Cemetery for 1877-79; Hastings, Parkville for 1882; Hillsdale for 1882-84; Manistique for 1881-85; Mackinaw City for 1881-87; Ionia for 1884; Swartz Creek for 1884-85; Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1877-87; Alma for 1890; Tecumseh for 1878-85; Harrisville for 1882, 1885-86; Thornville for 1877-92; Lansing for 1879-92; Agricultural College for 1877, 1881-92; Ann Arbor for 1881-92; Traverse City, Marshall for 1882-92; Gulliver Lake, Birmingham for 1887-92; Albion for 1890-91; Battle Creek for 1877-79, 1882, 1885, 1892; Rockland for 1892.

EXHIBIT 16.—*Comparisons of the Extremes and the Range of Temperature (Degrees Fahr.) during the Year, and during each month of the Year 1893, with the Average of the Extremes and of the Range, for the 20 years, 1873–92, also Statements of the Extremes and of the Range for each of the 7 years, 1887–92. Observations made with Registering Thermometers (except for the first two months of 1873, and for those two months with an ordinary thermometer, at 7 A. M., 2 P. M. and 9 P. M.) Daily by Prof. R. C. Kedzie,* **at the State Agricultural College, near Lansing, Mich.**

| Year and Months. | Extremes and Ranges of Temperature—Degrees F. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1887. | | | 1888. | | | 1889. | | | 1890. | | | 1891. | | | 1892. | | | Av. 20 years, 1873-92. | | | 1893.* | | | 1893 Higher (+), or Lower (-), than Av. 20 years, 1873-92. | | |
| | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. | Highest. | Lowest. | Range. |
| Year | 98 | -26 | 124 | 92 | -19 | 114 | 93 | -15 | 108 | 97 | -4 | 101 | 97 | -4 | 101 | 95 | -20 | 115 | 95 | -17 | 112 | 95 | -16 | 111 | + | + 1 | - 1 |
| Av. Month | 73 | 17 | 57 | 72 | 18 | 54 | 73 | 20 | 53 | 74 | 21 | 53 | 73 | 19 | 54 | 71 | 19 | 52 | 73 | 16 | 57 | 74 | 18 | 56 | + 1 | + 2 | - 1 |
| January | 46 | -26 | 72 | 36 | -16 | 52 | 50 | 2 | 48 | 63 | 3 | 60 | 51 | 2 | 49 | 50 | -20 | 70 | 48 | -10 | 58 | 45 | -16 | 61 | - 3 | + 6 | + 2 |
| February | 52 | 0 | 52 | 45 | -19 | 64 | 42 | -15 | 57 | 61 | 12 | 49 | 54 | -4 | 58 | 48 | -14 | 62 | 51 | - 9 | 60 | 43 | -10 | 53 | - 8 | + 1 | - 7 |
| March | 53 | -1 | 54 | 69 | 2 | 67 | 65 | 8 | 57 | 52 | -4 | 56 | 58 | 2 | 56 | 62 | 9 | 53 | 60 | 1 | 59 | 63 | 5 | 58 | + 3 | + 4 | - 1 |
| April | 76 | 14 | 62 | 81 | 21 | 60 | 75 | 20 | 55 | 76 | 20 | 56 | 79 | 19 | 60 | 73 | 20 | 53 | 78 | 17 | 61 | 76 | 21 | 55 | - 2 | + 4 | - 6 |
| May | 88 | 38 | 50 | 80 | 25 | 55 | 88 | 29 | 59 | 83 | 28 | 55 | 80 | 26 | 54 | 80 | 31 | 49 | 85 | 29 | 56 | 83 | 33 | 50 | - 2 | + 4 | - 6 |
| June | 91 | 43 | 48 | 92 | 39 | 53 | 85 | 39 | 46 | 92 | 39 | 53 | 88 | 87 | 51 | 87 | 42 | 45 | 90 | 40 | 50 | 90 | 51 | 39 | = | +11 | -12 |
| July | 98 | 44 | 54 | 90 | 47 | 43 | 89 | 47 | 42 | 92 | 44 | 48 | 86 | 42 | 44 | 95 | 45 | 50 | 93 | 46 | 47 | 92 | 46 | 46 | - 1 | = | - 1 |
| August | 98 | 37 | 61 | 90 | 86 | 54 | 93 | 42 | 51 | 97 | 34 | 63 | 97 | 40 | 57 | 90 | 45 | 45 | 93 | 40 | 53 | 95 | 38 | 57 | + 2 | - 2 | + 3 |
| September | 88 | 26 | 62 | 88 | 32 | 56 | 92 | 25 | 67 | 90 | 29 | 61 | 90 | 38 | 52 | 87 | 39 | 48 | 88 | 32 | 56 | 84 | 22 | 62 | - 4 | -10 | + 6 |
| October | 73 | 12 | 61 | 73 | 26 | 47 | 73 | 17 | 56 | 76 | 25 | 51 | 84 | 21 | 63 | 78 | 24 | 54 | 78 | 21 | 57 | 84 | 22 | 62 | + 6 | + 1 | + 5 |
| November | 65 | 13 | 52 | 72 | 13 | 59 | 58 | 11 | 47 | 62 | 20 | 42 | 58 | 0 | 58 | 58 | 13 | 45 | 63 | 9 | 54 | 65 | 6 | 59 | + 2 | - 3 | + 5 |
| December | 56 | -3 | 59 | 52 | 9 | 43 | 62 | 14 | 48 | 47 | 7 | 40 | 55 | 12 | 43 | 46 | -10 | 56 | 52 | -2 | 54 | 62 | -8 | 70 | +10 | +13 | +16 |

* For the 21 years, 1873-93, the highest temperature was 101°, August 11, 1874; the lowest was -33°, February 8, 1875, and the range was 134° F.

Foot-note to Exhibit 19:

* Beginning with the year 1885, allowance must be made for Lansing in Exhibit 19, because of a change in the location of instruments. The amount of the variation is shown in Exhibit D, on page 23, Report for 1888

† Mackinaw City for 1884-87; Kalamazoo for 1878-83, 1886-89; Mendon for 1878-82; Otisville for 1878-80, 1882; Nirvana for 1878-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Niles for 1878-79, 1881; Woodmere Cemetery for 1878-79; Washington for 1880-83; Cold water for 1878; Petoskey for 1879; Mallory Lake for first seven months of 1881; Hudson for last five months of 1881; Hillsdale for 1882-84; Hastings for 1882; Winfield for 1883; Manistee, Swartz Creek for 1884-85; Ionia for 1884; Pentwater for 1886; Marquette for 1879-84, 1886-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron for 1879-87; Detroit for 1878-87; Gulliver Lake for 1887-90, 1892; Alma for 1890; Thornville for 1878-92; Ann Arbor for 1881-92; Lansing for 1879-92; Agricultural College for 1881-92; Marshall, Traverse City for 1882-92; Birmingham for 1887-92; Albion for 1890-91; Battle Creek for 1878-79, 1882, 1885, 1892; Rockland for 1892.

EXHIBIT 17.—*Average Absolute Humidity, by year and months in 1893, compared with Annual and Monthly Averages for 1892, and for the 16 years, 1877–92.* These Averages are for groups of several stations in Michigan.*

| Years, etc. | Absolute Humidity—Grains of Vapor in a Cubic Foot of Air. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 16 years. 1877–92† | 3.44 | 1.45 | 1.56 | 1.79 | 2.77 | 3.91 | 5.46 | 6.04 | 5.74 | 4.88 | 3.52 | 2.32 | 1.80 |
| 1892 (10 stations) | 3.49 | 1.35 | 1.80 | 1.79 | 2.61 | 3.97 | 6.08 | 6.23 | 5.92 | 4.88 | 3.34 | 2.28 | 1.64 |
| 1893 (7 stations) | 3.51 | 1.19 | 1.42 | 2.03 | 2.77 | 3.83 | 6.12 | 6.50 | 5.58 | 4.78 | 3.72 | 2.37 | 1.83 |
| In 1893 Greater than Av. for 16 years, 1877–92 | .07 | ...... | ...... | .24 | 0 | ...... | .66 | .46 | ...... | ...... | .20 | .05 | .03 |
| In 1893 Less than Av. for 16 years, 1877–92 | ........ | .26 | .14 | ...... | 0 | .08 | ...... | ...... | .16 | .10 | ...... | ...... | ...... |
| In 1893 Greater than in 1892 | .02 | ...... | ...... | .24 | .16 | ...... | .04 | .27 | ...... | ...... | .38 | .14 | .19 |
| In 1893 Less than in 1892 | ........ | .16 | .38 | ...... | ...... | .14 | ...... | ...... | .34 | .10 | ...... | ...... | ...... |

For foot-notes to Exhibit 17 see page 28.

EXHIBIT 18.—*Comparison of the Average Absolute Humidity for the year and for each month of the year 1893, with Averages for the 27 years, 1866–92, and for the year 1892. Observations made at 7 A. M., 2 P. M. and 9 P. M., daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Mich.*

| Years, etc. | Absolute Humidity—Grains of Vapor in a Cubic Foot of Air. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 27 Years, 1866–92 | 3.47 | 1.47 | 1.57 | 1.84 | 2.71 | 4.02 | 5.66 | 6.33 | 5.89 | 4.81 | 3.33 | 2.22 | 1.71 |
| 1892 | 3.50 | 1.35 | 1.80 | 1.74 | 2.58 | 3.98 | 6.27 | 6.10 | 5.88 | 4.83 | 3.47 | 2.20 | 1.75 |
| 1893 | 3.60 | 1.11 | 1.47 | 2.09 | 2.90 | 3.92 | 6.02 | 6.45 | 6.02 | 5.29 | 3.76 | 2.40 | 1.80 |
| In 1893 Greater than Av. for 27 years, 1866-92 | .13 | ...... | ...... | .25 | .19 | ...... | .36 | .12 | .13 | .48 | .43 | .18 | .09 |
| In 1893 Less than Av. for 27 years, 1866–92 | ........ | .36 | .10 | ...... | ...... | .10 | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| In 1893 Greater than in 1892 | .10 | ...... | ..... | .35 | .32 | ...... | ...... | .35 | .14 | .46 | .29 | .20 | .05 |
| In 1893 Less than in 1892 | ........ | .24 | .33 | ...... | ...... | .06 | .25 | ...... | ...... | ...... | ...... | ...... | ...... |

EXHIBIT 19.—*Average Relative Humidity, by year and months, in 1893,* compared with Annual and Monthly Averages for 1892, and for the 15 years, 1878–92. These averages are for groups of several stations in Michigan.*

| Years, etc. | Per Cent of Saturation—Relative Humidity. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 15 years, 1878-92† | 76 | 83 | 83 | 78 | 70 | 69 | 73 | 72 | 73 | 76 | 76 | 80 | 83 |
| 1892 (10 stations) | 80 | 88 | 90 | 83 | 71 | 77 | 80 | 72 | 74 | 77 | 75 | 88 | 89 |
| 1893 (7 stations) | 79 | 89 | 88 | 84 | 73 | 72 | 74 | 72 | 70 | 75 | 79 | 82 | 88 |
| In 1893 Greater than Av. for 15 years, 1878-92 | 3 | 6 | 5 | 6 | 3 | 3 | 1 | 0 | ...... | ...... | 3 | 2 | 5 |
| In 1893 Less than Av. for 15 years, 1878-92 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 3 | 1 | ...... | ...... | ...... |
| In 1893 Greater than in 1892 | ...... | 1 | ...... | 1 | 2 | ...... | ...... | 0 | ...... | ...... | 4 | ...... | ...... |
| In 1893 Less than in 1892 | 1 | ...... | 2 | ...... | ...... | 5 | 6 | ...... | 4 | 2 | ...... | 6 | 1 |

For foot-notes to Exhibit 19 see page 29.

EXHIBIT 20.—*Comparison of the Average Relative Humidity of the Air (Per Cent of Saturation) for the year, and for each month of the year 1893, with Averages for the 29 years, 1864–92, and for 1892. Observations made at 7 A. M., 2 P. M. and 9 P. M., daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

| Years, etc. | Per Cent of Saturation—Relative Humidity. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 29 years, 1864-92. | 79 | 87 | 86 | 82 | 70 | 69 | 76 | 73 | 75 | 78 | 79 | 82 | 86 |
| 1892 | 79 | 86 | 86 | 77 | 63 | 76 | 83 | 73 | 75 | 77 | 78 | 83 | 89 |
| 1893 | 81 | 82 | 87 | 85 | 75 | 75 | 78 | 75 | 78 | 88 | 81 | 87 | 83 |
| In 1893 Greater than Av. for 29 years, 1864-92 | 2 | ...... | 1 | 3 | 5 | 6 | 2 | 2 | 3 | 10 | 2 | 5 | ...... |
| In 1893 Less than Av. for 29 years, 1864-92 | ...... | 5 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | 3 |
| In 1893 Greater than in 1892 | 2 | ...... | 1 | 8 | 12 | ...... | ...... | 2 | 3 | 11 | 3 | 4 | ...... |
| In 1893 Less than in 1892 | ...... | 4 | ...... | ...... | ...... | 1 | 5 | ...... | ...... | ...... | ...... | ...... | 6 |

TABLE IV.—ABSOLUTE HUMIDITY.—*The Average Number of Grains of Vapor of Water in a Cubic Foot of Air for Months and Year 1893, at 13 Stations in Michigan; also Average Line for 7 Stations.—Average of Observations made Daily at 7 A. M., 2 P. M., and 9 P. M., by observers* for the State Board of Health.*

| Stations in Michigan.* | Divisions of the State.† | Grains of Vapor in a Cubic Foot of Air—(Absolute Humidity.)§ | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year. | | Months, 1893. | | | | | | | | | | | |
| | | Norm. ‡ | 1893. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. for 7 stations.¶ | ------- | ------ | 3.51 | 1.19 | 1.42 | 2.03 | 2.77 | 3.83 | 6.12 | 6.50 | 5.58 | 4.78 | 3.72 | 2.37 | 1.83 |
| Rockland | U. P. | ---- | ** | [l] 1.03 | [k] 1.22 | [d] 1.68 | [j] 2.12 | ------ | [d] 5.32 | [f] 5.37 | [m] 4.89 | [i] 4.08 | [e] 3.15 | [g] 2.08 | [k] 1.40 |
| Traverse City | N. W. | $3.35^{12}$ | 3.25 | 1.37 | 1.38 | 1.92 | [d] 2.86 | 3.26 | 5.41 | 6.01 | 5.17 | 4.60 | 3.50 | 2.34 | 1.82 |
| Harrisville | N. E. | ------ | †† | ---- | ------ | ------ | ---- | ------ | 4.75 | 5.22 | 4.89 | 4.01 | 3.11 | 1.71 | ---- |
| Ashton | N. C. | ----- | ‡‡ | ---- | 1.38 | 1.85 | 2.92 | 3.81 | 5.79 | 5.70 | 4.73 | 3.95 | 3.29 | 1.87 | ---- |
| Thornville | B. & E. | $3.68^{17}$ | 3.53 | 1.27 | 1.51 | 2.00 | 2.87 | 3.80 | 6.06 | 6.66 | 5.53 | 4.64 | 3.65 | 2.43 | 1.92 |
| Agr'l College | C. | $3.49^{14}$ | 3.60 | 1.11 | 1.47 | 2.09 | 2.90 | 3.92 | 6.02 | 6.45 | 6.02 | 5.29 | 3.76 | 2.40 | 1.80 |
| Lansing S. B. of H.‖ | C. | $3.38^{15}$ | 3.35 | 1.16 | 1.41 | 2.10 | 2.68 | 3.66 | 5.95 | 6.19 | 5.11 | 4.48 | 3.52 | 2.18 | 1.72 |
| Albion | S. C. | ------ | ¶¶ | 1.03 | 1.36 | 2.03 | 2.81 | 3.94 | 6.10 | 6.34 | 5.11 | ------ | 3.45 | 2.21 | 1.78 |
| Ann Arbor | S. C. | $3.49^{13}$ | 3.43 | 1.12 | 1.39 | 1.95 | 2.64 | 3.74 | 6.21 | 6.49 | 5.53 | 4.62 | 3.50 | 2.22 | 1.74 |
| Battle Creek | S. C. | $3.88^{2}$ | 3.89 | 1.41 | 1.69 | [c] 2.32 | 3.00 | 4.29 | 6.71 | 7.08 | 6.02 | 5.15 | 4.21 | 2.60 | 2.21 |
| Marshall | S. C. | ------ | §§ | 0.87 | 1.32 | 2.07 | 3.00 | 3.97 | 6.24 | 6.69 | 5.32 | 5.13 | 3.66 | ---- | ---- |
| Tecumseh | S. C. | ------ | ‖‖ | ---- | ------ | ------ | ---- | 3.99 | [d] 6.38 | 6.38 | [a] 5.32 | 4.65 | 3.52 | 2.20 | 1.61 |
| Birmingham | S. E. | $3.56^{7}$ | 3.53 | [b] 0.90 | 1.08 | 1.85 | [d] 2.95 | [c] 4.14 | [h] 6.49 | [a] 6.61 | [c] 5.65 | [d] 4.77 | [a] 3.88 | 2.43 | [a] 1.57 |

* The names of observers, their places of observation, and the counties in which these places are situated are stated in Exhibit 1, page 2.

† The full names of the divisions and the counties in each division are stated in Exhibit 1., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual Absolute Humidity for periods of years ending in each case with Dec. 31, 1893. The small figures above and at the right of numbers which state the Absolute Humidity, denote the number of years included in the average.

§ The number of grains of vapor in a cubic foot of air at each observation was determined from readings of the psychrometer by means of Glaisher's table, Table XII., of the Smithsonian Meteorological and Physical Tables (1859).

¶ This line is an average for only the stations at which observations were made tri-daily, and from which statements, nearly complete, were received for every month of the year. It does not include the lines for Harrisville, Ashton, Albion, Rockland, Marshall and Tecumseh.

** The average for 11 months is 2.94. †† For 6 months, 3.95. ‡‡ For 10 months, 3.53. ¶¶ For 11 months, 3.29. §§ For 10 months, 3.83. ‖‖ For 8 months, 4.26.

‖ Beginning with the year 1885, allowance must be made for Lansing in Table IV., because of a change in the location of the instruments. The amount of variation by months is shown in Exhibit C, page 28, Report for 1886.

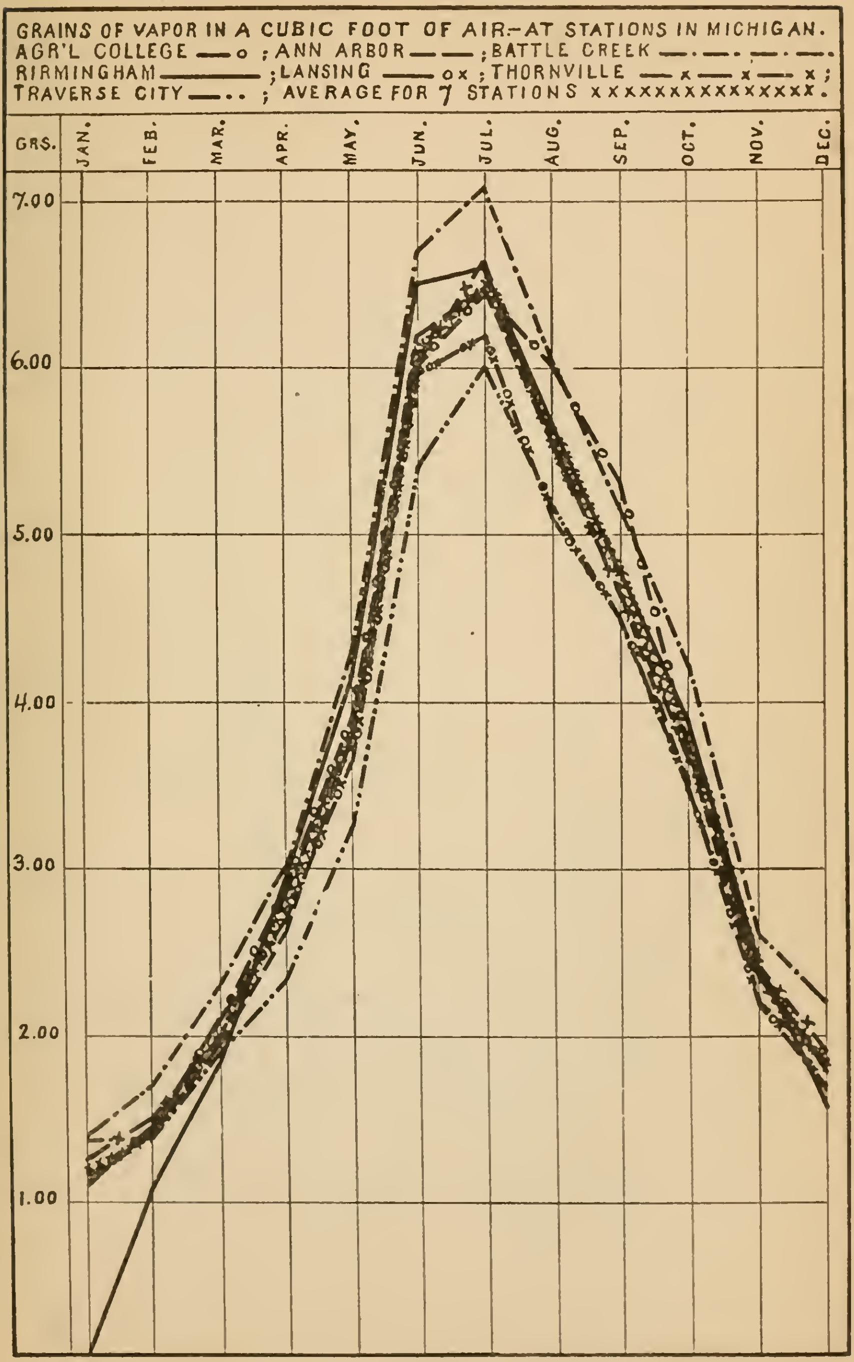
NOTE.—The computations of Absolute Humidity at Ann Arbor and Albion for each month in 1893 were furnished by the observers there. All other computations in Table IV. were made at the office of the Secretary of the State Board of Health.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 92 observations.
e For 87 observations.
i For 81 observations.
b For 91 observations.
f For 86 observations.
j For 79 observations.
c For 90 observations.
g For 85 observations.
k For 78 observations.
d For 89 observations.
h For 84 observations.
l For 77 observations.
m For 75 observations.

The "average" line, and the lines for seven stations in Table IV. are graphically represented in Diagram III, page 33.

DIAGRAM III.- ABSOLUTE HUMIDITY, BY MONTHS, 1893.



[Plate 745.]

TABLE V.—RELATIVE HUMIDITY.—*Average Per Cent of Saturation of the Atmosphere with Vapor of Water for Months and Year 1893 at 13 Stations in Michigan; also average line for 7 Stations. Average of observations made daily at 7 A. M., 2 P. M. and 9 P. M., by observers* for the State Board of Health.*

| Stations in Michigan.* | Divisions of the State. † | Per Cent of Saturation.—Relative Humidity. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year. | | Months, 1893. | | | | | | | | | | | |
| | | Norm. ‡ | 1893. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
| Av. for 7 stations § | ----- | ----- | 79 | 89 | 88 | 84 | 73 | 72 | 74 | 72 | 70 | 75 | 79 | 82 | 88 |
| Rockland | U. P. | ----- | ¶ | [l] 100 | [k] 99 | [d] 93 | [j] 81 | ----- | [d] 66 | [f] 66 | [m] 63 | [i] 69 | [e] 79 | [g] 90 | [k] 100 |
| Traverse City | N. W. | 82$^{12}$ | 80 | 97 | 95 | 90 | [d] 71 | 72 | 70 | 70 | 68 | 74 | 75 | 82 | 96 |
| Harrisville | N. E. | ----- | ** | ----- | ----- | ----- | ----- | ----- | 70 | 69 | 67 | 66 | 70 | 61 | ----- |
| Ashton | N. C. | ----- | ‖ | ----- | 93 | 87 | 91 | 79 | 71 | 67 | 59 | 59 | 68 | 67 | ----- |
| Thornville | B. & E. | 79$^{16}$ | 77 | 92 | 91 | 82 | 74 | 68 | 71 | 71 | 67 | 68 | 73 | 80 | 90 |
| Agr'l College | C. | 79$^{30}$ | 81 | 82 | 87 | 85 | 75 | 75 | 78 | 75 | 78 | 88 | 81 | 87 | 83 |
| Lansing, S. B. of H.¶¶ | C. | 72$^{15}$ | 75 | 85 | 85 | 84 | 69 | 67 | 74 | 70 | 65 | 70 | 73 | 75 | 82 |
| Albion | S. C. | ----- | †† | 75 | 81 | 80 | 78 | 75 | 75 | 68 | 62 | ----- | 78 | 80 | 83 |
| Ann Arbor | S. C. | 79$^{13}$ | 83 | 97 | 94 | 90 | 77 | 74 | 78 | 75 | 72 | 75 | 83 | 85 | 92 |
| Battle Creek | S. C. | 82$^{2}$ | 82 | 99 | 97 | [c] 87 | 73 | 74 | 74 | 71 | 69 | 76 | 85 | 85 | 97 |
| Marshall | S. C. | ----- | ‡‡ | 70 | 80 | 79 | 76 | 74 | 76 | 73 | 64 | 78 | 79 | ----- | ----- |
| Tecumseh | S. C. | ----- | §§ | ----- | ----- | ----- | ----- | 72 | [d] 74 | 73 | [a] 67 | 70 | 77 | 76 | 79 |
| Birmingham | S. E. | 76$^{7}$ | 74 | [b] 74 | 67 | 72 | [d] 75 | [c] 74 | [h] 75 | [a] 72 | [c] 70 | [d] 72 | [a] 81 | 79 | [a] 73 |

NOTE.—The observations in Table V. were reduced by Guyot's table, in Smithsonian Meteorological Tables, or by a table substantially the same as that. Computations for Ann Arbor and Albion in 1893 were made by the observers there. All other Computations in Table V. were make at the office of the State Board of Health.

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

† The full names of the divisions, and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual relative humidity for periods of years ending in each case with December 31, 1893. The small figures above and at the right of the numbers which state the relative humidity, denote the number of years included in the average.

§ This line is an average for only the stations at which observations were made tri-daily and from which statements, nearly complete, were received for every month in the year. It does not include Ashton, Albion, Harrisville, Rockland, Marshall and Tecumseh.

¶ The average for 11 months is 82. ** For 6 months, 67. ‖ For 10 months, 74. †† For 11 months, 76.
‡‡ For 10 months, 75. §§ For 8 months, 74.

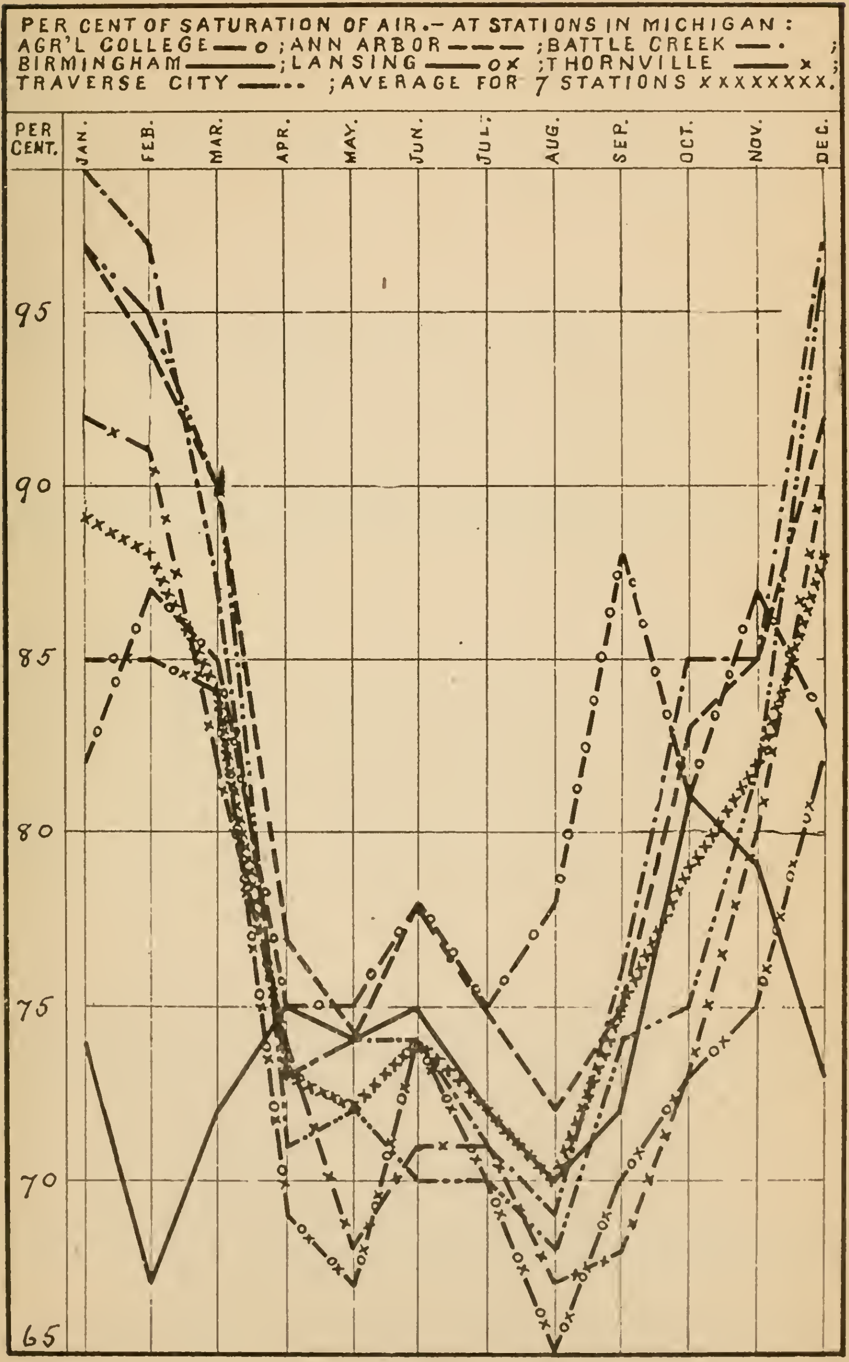
¶¶ Beginning with the year 1885, allowance must be made for Lansing in Table V., because of a change in location of the instruments. The amount of the variation by months is shown in Exhibit D, on page 23, Report for 1886.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

| | | |
|---|---|---|
| a For 92 observations. | b For 91 observations. | c For 90 observations. |
| d For 89 observations. | e For 87 observations. | f For 86 observations. |
| g For 85 observations. | h For 84 observations. | i For 81 observations. |
| j For 79 observations. | k For 78 observations. | l For 77 observations. |
| m For 75 observations. | | |

Graphic representations of 8 representative lines in Table V. are given in Diagram IV., page 35.

DIAGRAM IV.—RELATIVE HUMIDITY, BY MONTHS, 1893.



[Plate 716.]

## FOGS.

For the year 1893, fog was reported at 63 morning observations, at 6 afternoon observations (at about 2 P. M.), at 7 evening observations (at about 9 P. M.), and 62 times during the day, no special time being mentioned, in many cases the same fog, or fog at the same time, being reported by different observers. Fog was reported, at one or more stations at some time during the day, on 58 days.

EXHIBIT 21.—*Number of different days on which Fog was observed at one or more of 12 Stations in Michigan* in 1893, and in each month of the year 1893.*

| Year. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 68 | 2 | 2 | 3 | 3 | 9 | 8 | 5 | 8 | 8 | 10 | 6 | 4 |

* This exhibit contains statements only for those localities from which reports were received for every month of the year, as follows: Rockland, Marquette, Sault Ste. Marie, Traverse City, Grand Haven, Battle Creek, Thornville, Lansing, Ann Arbor, Parkville, Birmingham and Tecumseh.

Exhibit 21, "Number of different days on which fog was observed," etc., supplies knowledge of the *time*, in each month, on which fog was observed, somewhere in Michigan. Exhibit 22, "Number of observations at which fog was observed," etc., supplies knowledge of the *time* combined with the *area* of the occurrences of fog. For the State as a whole, therefore, the last-mentioned exhibit supplies the most important information. Therefore, in this Report the diagram relative to fog is made to exhibit the facts contained in this last-mentioned exhibit. Heretofore it has represented the "Number of different days on which fog was observed at one or more stations in Michigan."

EXHIBIT 22.—*Number of Observations at which Fog was observed in Michigan in 1893, and in each month of the year 1893. (Observations taken 3 times daily,* at 12 Stations.†)*

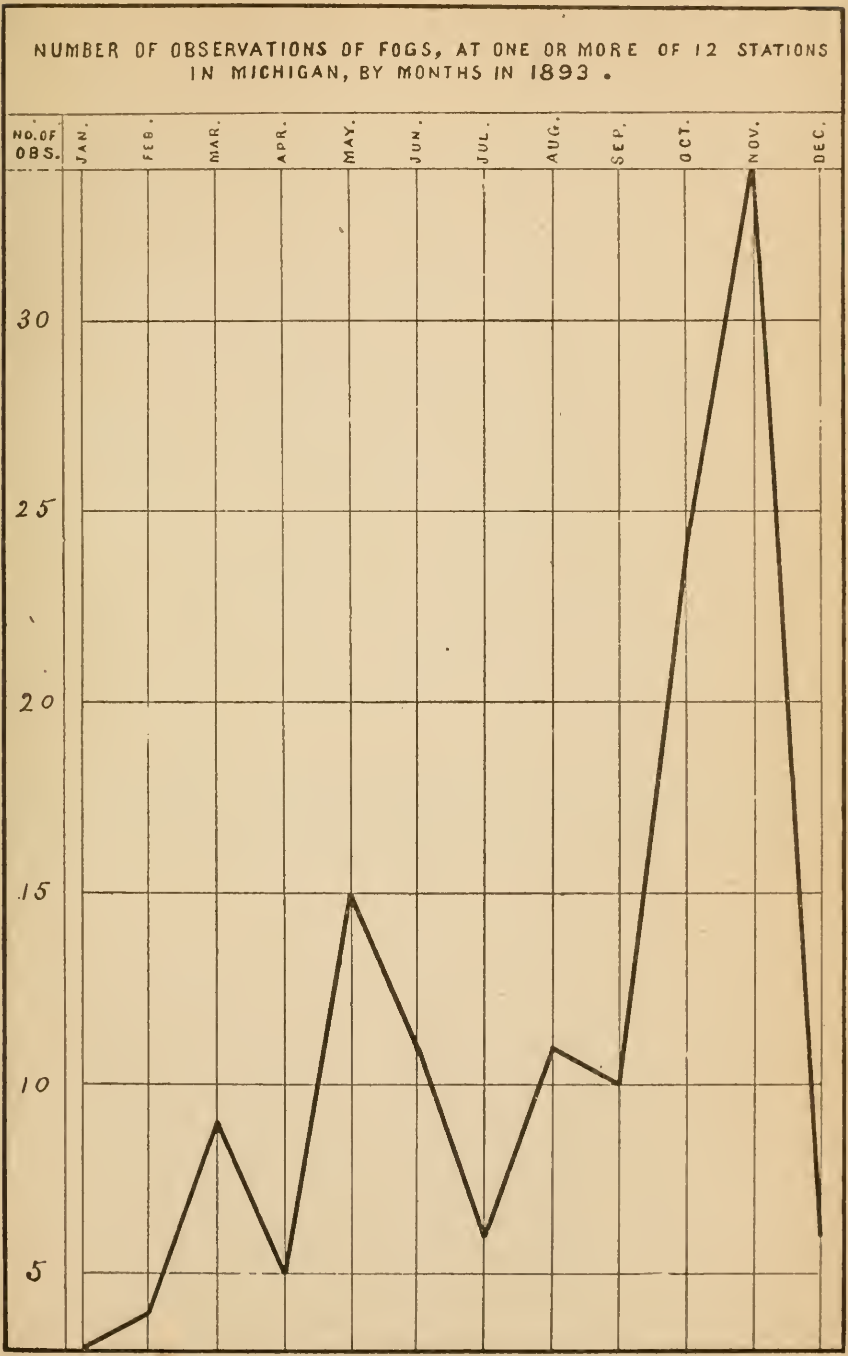
| Year. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 138 | 3 | 4 | 9 | 5 | 15 | 11 | 6 | 11 | 10 | 24 | 34 | 6 |

* At the U. S. Weather Bureau Stations the observations were made at 8 A. M. and 8 P. M., 75th Meridian time, unless otherwise stated in Exhibit 23.

† This exhibit contains statements only for those localities from which registers were received for every month of the year; the localities are stated in a foot-note to Exhibit 21 above.

NOTE.—Graphic representations of statements in Exhibit 22 are given in Diagram V., page 37.

DIAGRAM V.—CONCERNING FOGS IN MICHIGAN IN 1893.



[Plate 747.]

EXHIBIT 23.—*Number of different days on which Fog was recorded in 1893, and at 15 stations*

| Stations in Michigan.* | No. of days in 1893. | January. | | | February. | | | Line number. |
|---|---|---|---|---|---|---|---|---|
| | | Day of Month. | Hour of Observation. | | Day of Month. | Hour of Observation. | | |
| | | | A. M. | P. M. | | A. M. | P. M. | |
| Rockland | 7 | 0 | ---------- | ---------- | 0 | ---------- | ---------- | 1 |
| Marquette | 10 | 0 | ---------- | ---------- | 0 | ---------- | ---------- | 2 |
| Sault Ste. Marie | 3 | 0 | ---------- | ---------- | 0 | ---------- | ---------- | 3 |
| Traverse City | 4 | 0 | ---------- | ---------- | 0 | ---------- | ---------- | 4 |
| Grand Haven | 20 | 28 | ---------- | ---------- | 6 | ---------- | ---------- | 5 |
| Ashton | 7 | 28 | ---------- | ---------- | 0 | ---------- | ---------- | 6 |
| Thornville | 11 | 0 | ---------- | ---------- | 6 | Early till | 1:00 | 7 |
| | ---------- | ---------- | ---------- | ---------- | 14 | Morning | ---------- | 8 |
| Lansing, S. B. of H. | 15 | 0 | ---------- | ---------- | 14 | 7 till 8 | ---------- | 9 |
| Albion | 19 | 15,16,19, 21,25 | 7:00 | ---------- | 0 | ---------- | ---------- | 10 |
| | ---------- | 14 | ---------- | 2:00 | ---------- | ---------- | ---------- | 11 |
| | ---------- | 18 | ---------- | 9:00 | ---------- | ---------- | ---------- | 12 |
| Ann Arbor | 18 | 0 | ---------- | ---------- | 0 | ---------- | ---------- | 13 |
| Parkville | 23 | 4 | ---------- | ---------- | 6 | ---------- | ---------- | 14 |
| Tecumseh | 8 | 0 | ---------- | ---------- | 0 | ---------- | ---------- | 15 |
| Birmingham | 6 | 0 | ---------- | ---------- | 0 | ---------- | ---------- | 16 |
| Detroit | 16 | 0 | ---------- | ---------- | 6, 14 | ---------- | ---------- | 17 |

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* The names of observers, their places of observation, and the counties in which the places are situated are stated in Exhibit 1, page 2.

*in each month, the dates and hours of observation† when Fogs were recorded in Michigan.*

| Line number. | March. | | | April. | | | May. | | | June. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day of Month. | Hour of Observation. | | Day of Month. | Hour of Observation. | | Day of Month. | Hour of Observation. | | Day of Month. | Hour of Observation. | |
| | | A. M. | P. M. | | A. M. | P. M. | | A. M. | P. M. | | A. M. | P. M. |
| 1 | 23 | ---------- | 9:00 | 0 | ------ | ------ | 28 | 7:00 | -------- | 4 | ---------- | 9:00 |
| 2 | 1 | ---------- | -------- | 1 | ------ | ------ | 2,3,11,<br>12,14,15 | ---------- | -------- | 2 | ---------- | ------ |
| 3 | 2 | ---------- | -------- | 8 | ------ | ------ | 0 | ---------- | -------- | 0 | ---------- | ------ |
| 4 | 23 | ---------- | 9:00 | 0 | ------ | ------ | 0 | ---------- | -------- | 0 | ---------- | ------ |
| 5 | 0 | ---------- | -------- | 17 | ------ | ------ | 13,14 | ---------- | -------- | 4,5,<br>11,21 | ---------- | ------ |
| 6 | 0 | ---------- | -------- | 0 | ------ | ------ | 0 | ---------- | -------- | 0 | ---------- | ------ |
| 7 | 23 | Morning | -------- | 0 | ------ | ------ | 1 | Morning | -------- | 28 | 7:00 | ------ |
| 8 | -------- | ---------- | -------- | -------- | ------ | ------ | ------------ | ---------- | -------- | -------- | ---------- | ------ |
| 9 | 0 | ---------- | -------- | 0 | ------ | ------ | 1 | 7:00 | -------- | 0 | ---------- | ------ |
| 10 | 23 | 5 till 10 | -------- | 0 | ------ | ------ | 1 | 5 till 10 | -------- | 0 | ---------- | ------ |
| 11 | -------- | ---------- | -------- | -------- | ------ | ------ | ------------ | ---------- | -------- | -------- | ---------- | ------ |
| 12 | -------- | ---------- | -------- | -------- | ------ | ------ | ------------ | ---------- | -------- | -------- | ---------- | ------ |
| 13 | 23 | A. M. | 9:00 | 0 | ------ | ------ | 0 | ---------- | -------- | 17 | Morning | ------ |
| 14 | 28 | ---------- | -------- | 8,17 | ------ | ------ | 1,14,15 | ---------- | -------- | 29 | ---------- | ------ |
| 15 | 0 | ---------- | -------- | 0 | ------ | ------ | 0 | ---------- | -------- | 28 | 7:00 | ------ |
| 16 | 0 | ---------- | -------- | 0 | ------ | ------ | 0 | ---------- | -------- | 28 | 7:00 | ------ |
| 17 | 8 | ---------- | -------- | 0 | ------ | ------ | 1 | ---------- | -------- | 0 | ---------- | ------ |

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†At the U. S. Weather Bureau Stations during 1893, the observations were made at 8 A. M. and 8 P. M., 75th Meridian time, unless otherwise stated in this exhibit.

NOTE.—Registers were received, but with no fog recorded thereon, from Kalamazoo, Agricultural College, Harrisville and Port Huron for each month in 1893. A cipher (0) indicates that a monthly register was received from the station with no fog recorded thereon.

EXHIBIT 23.—CONTINUED.—*Dates when*

| Stations in Michigan. | July. | | | August. | | | September. | | | Line Number. |
|---|---|---|---|---|---|---|---|---|---|---|
| | Day of Month. | Hour of Observation. | | Day of Month. | Hour of Observation. | | Day of Month. | Hour of Observation. | | |
| | | A. M. | P. M. | | A. M. | P. M. | | A. M. | P. M. | |
| Rockland | 5, 8 | 7:00 | -------- | 0 | -------- | -------- | 0 | -------- | -------- | 1 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 2 |
| Marquette | 0 | -------- | -------- | 16 | -------- | -------- | 0 | -------- | -------- | 3 |
| Sault Ste. Marie | 0 | -------- | -------- | 0 | -------- | -------- | 0 | -------- | -------- | 4 |
| Traverse City | 0 | -------- | -------- | 0 | -------- | -------- | 0 | -------- | -------- | 5 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 6 |
| Grand Haven | 0 | -------- | -------- | 17, 31 | -------- | -------- | 15 | -------- | -------- | 7 |
| Ashton | 15 | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 8 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 9 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 10 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 11 |
| Thornville | 0 | -------- | -------- | 26 | 7:00 | -------- | 18 | 7:00 | -------- | 12 |
| Lansing, S. B. of H. | 0 | -------- | -------- | 25 | -------- | Night till | 7 | -------- | Night till | 13 |
| | -------- | -------- | -------- | 26 | 8:00 | -------- | 8 | 7:45 | -------- | 14 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 15 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 16 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 17 |
| Albion | 0 | -------- | -------- | 0 | -------- | -------- | 0 | -------- | -------- | 18 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 19 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 20 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 21 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 22 |
| Ann Arbor | 2 | Morning | -------- | 20, 26 | Morning | -------- | 14, 16 | Morning | -------- | 23 |
| Battle Creek | 0 | -------- | -------- | 0 | -------- | -------- | 15, 17 | 7:00 | -------- | 24 |
| Parkville | 21, 29 | -------- | -------- | 21,30,31 | -------- | -------- | 2, 17 | -------- | -------- | 25 |
| Tecumseh | 0 | -------- | -------- | 0 | -------- | -------- | 0 | -------- | -------- | 26 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 27 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 28 |
| | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | 29 |
| Birmingham | 0 | -------- | -------- | 0 | -------- | -------- | 0 | -------- | -------- | 30 |
| Detroit | 0 | -------- | -------- | 0 | -------- | -------- | 15 | -------- | -------- | 31 |

*Fogs were recorded in 1893.*

| Line number. | October. | | | November. | | | December. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Day of Month. | Hour of Observation. | | Day of Month. | Hour of Observation. | | Day of Month. | Hour of Observation. | |
| | | A. M. | P. M. | | A. M. | P. M. | | A. M. | P. M. |
| 1 | 0 | ---------- | ---------- | 8 | ---------- | 9:00 | 0 | ---------- | ---------- |
| 2 | ---------- | ---------- | ---------- | 9 | 7:00 | ---------- | ---------- | ---------- | ---------- |
| 3 | 0 | ---------- | ---------- | 0 | ---------- | ---------- | 0 | ---------- | ---------- |
| 4 | 1 | ---------- | ---------- | 0 | ---------- | ---------- | 0 | ---------- | ---------- |
| 5 | 13 | 7:00 | ---------- | 0 | ---------- | ---------- | 24 | 7:00 | 2:00 |
| 6 | 20 | ---------- | 9:00 | ---------- | ---------- | ---------- | ---------- | ---------- | ---------- |
| 7 | 0 | ---------- | ---------- | 8, 9, 10, 11, 12 | ---------- | ---------- | 15,16,23 | ---------- | ---------- |
| 8 | ---------- | ---------- | ---------- | 8, 12 | 7:00 | ---------- | 0 | ---------- | ---------- |
| 9 | ---------- | ---------- | ---------- | 9 | ---------- | 2 & 9 | ---------- | ---------- | ---------- |
| 10 | ---------- | ---------- | ---------- | 10 | 7:00 | 2 & 9 | ---------- | ---------- | ---------- |
| 11 | ---------- | ---------- | ---------- | 11 | 7:00 | 9:00 | ---------- | ---------- | ---------- |
| 12 | 19, 23 | Morning | ---------- | 7, 9 | Morning | ---------- | 0 | ---------- | ---------- |
| 13 | 20 | ---------- | Night till | 9 | 9:30 till | 3:00 | 15 | 9:30 | ---------- |
| 14 | 21 | 8:30 | ---------- | 10 | ---------- | Night till | ---------- | ---------- | ---------- |
| 15 | 22 | ---------- | Night till | 11 | 7:00 till | 2:00 | ---------- | ---------- | ---------- |
| 16 | 23 | 8:30 | ---------- | 11 | ---------- | Night till | ---------- | ---------- | ---------- |
| 17 | ---------- | ---------- | ---------- | 12 | 9:30 | ---------- | ---------- | ---------- | ---------- |
| 18 | 7 | ---------- | Night till | 8 | ---------- | 9 till | 0 | ---------- | ---------- |
| 19 | 8 | 7:30 | ---------- | 9 | 10:00 | ---------- | 0 | ---------- | ---------- |
| 20 | 20 | ---------- | Night till | 11 | ---------- | 7 till | 0 | ---------- | ---------- |
| 21 | 21 | 10:00 | ---------- | 12 | 10:30 | ---------- | ---------- | ---------- | ---------- |
| 22 | 22, 23 | Morning | ---------- | ---------- | ---------- | ---------- | ---------- | ---------- | ---------- |
| 23 | 11, 12, 19, 22, 23 | Morning | ---------- | 7, 8, 9, 10, 11, 12 | Morning | ---------- | 0 | ---------- | ---------- |
| 24 | 21, 23 | 7:00 | ---------- | 10 | 7:00 | ---------- | 0 | ---------- | ---------- |
| 25 | 21, 23 | ---------- | ---------- | 8, 9, 10, 11, 12 | ---------- | ---------- | 0 | ---------- | ---------- |
| 26 | 11, 19, 22 | 7:00 | ---------- | 7 | 7:00 | ---------- | 0 | ---------- | ---------- |
| 27 | ---------- | ---------- | ---------- | 10 | 7:00 | 9:00 | ---------- | ---------- | ---------- |
| 28 | ---------- | ---------- | ---------- | 11 | 7:00 | 2 & 9 | ---------- | ---------- | ---------- |
| 29 | ---------- | ---------- | ---------- | 12 | 7:00 | 2:00 | ---------- | ---------- | ---------- |
| 30 | 18, 19, 22, 23 | 7:00 | ---------- | 7 | 7:00 | ---------- | 0 | ---------- | ---------- |
| 31 | 3, 18, 19, 21, 22, 23 | ---------- | ---------- | 6, 7, 9 | ---------- | ---------- | 14, 15 | ---------- | ---------- |

TABLE VI.—*Average Per Cent of Cloudiness for Months and Year 1893, at 13 Stations in Michigan; also Average Line for 8 Stations. Average of Observations made Daily at 7 A. M., 2 P. M., and 9 P. M., by observers* for the State Board of Health.*

| Stations in Michigan.* | Divisions of the State.† | Average Per Cent of Cloudiness. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year. | | Months, 1893. | | | | | | | | | | | |
| | | Norm. ‡ | 1893. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept | Oct. | Nov. | Dec. |
| Av. for 8 stations.§ | ------- | ------ | 54 | 76 | 65 | 56 | 68 | 50 | 34 | 38 | 30 | 43 | 47 | 65 | 80 |
| Rockland...... | U. P. | ----- | ¶ | $\overset{m}{72}$ | $\overset{m}{51}$ | 46 | $\overset{m}{64}$ | ------ | $\overset{f}{34}$ | $\overset{g}{31}$ | $\overset{o}{31}$ | $\overset{n}{36}$ | $\overset{e}{62}$ | $\overset{e}{69}$ | $\overset{i}{86}$ |
| Traverse City... | N. W. | $60^{12}$ | 59 | 93 | $\overset{j}{68}$ | $\overset{d}{58}$ | $\overset{d}{67}$ | $\overset{a}{53}$ | 29 | $\overset{a}{46}$ | 30 | $\overset{h}{53}$ | $\overset{c}{54}$ | $\overset{d}{70}$ | $\overset{b}{90}$ |
| Harrisville..... | N. E. | $60^{9}$ | 58 | 73 | 63 | 53 | 72 | 51 | 37 | 46 | 32 | 58 | 53 | 74 | 87 |
| Ashton .......... | N. C. | ----- | ** | 67 | 38 | 36 | 41 | 28 | 20 | 22 | 16 | 18 | 24 | $\overset{i}{45}$ | ---- |
| Thornville...... | B. & E. | $52^{17}$ | 49 | 72 | 56 | 53 | 58 | 46 | 31 | 34 | 29 | 35 | 41 | $\overset{d}{59}$ | 75 |
| Agr'l College... | C. | $58^{30}$ | 55 | 78 | 66 | 57 | 71 | 52 | 40 | 39 | 32 | 42 | 45 | 62 | 79 |
| Lansing S. B. of H. ....... | C. | $57^{15}$ | 58 | 81 | 74 | 60 | 74 | 52 | 34 | 44 | 38 | 39 | 47 | 67 | 85 |
| Albion .......... | S. C. | ----- | †† | 72 | 71 | 57 | 70 | 43 | 30 | 36 | 31 | ------ | 40 | 60 | 77 |
| Ann Arbor..... | S. C. | $58^{14}$ | 54 | 77 | 72 | 58 | 71 | 51 | 31 | 37 | 25 | 34 | 43 | 62 | 81 |
| Battle Creek ... | S. C. | $49^{3}$ | 44 | 55 | 58 | 44 | 60 | 38 | 23 | 23 | 21 | $\overset{e}{35}$ | $\overset{d}{45}$ | $\overset{d}{58}$ | 67 |
| Marshall....... | S. C. | ------ | ‡‡ | 69 | 67 | 50 | 68 | 41 | 23 | $\overset{a}{30}$ | 18 | 28 | 35 | ---- | ---- |
| Tecumseh ...... | S. C. | ----- | ¶¶ | ---- | ------ | ------ | ---- | 46 | $\overset{d}{26}$ | 28 | 23 | $\overset{d}{33}$ | $\overset{c}{31}$ | $\overset{k}{56}$ | 68 |
| Birmingham .. | S. E. | $59^{7}$ | 59 | $\overset{h}{81}$ | $\overset{j}{65}$ | $\overset{k}{67}$ | $\overset{f}{73}$ | $\overset{k}{57}$ | $\overset{p}{48}$ | $\overset{k}{32}$ | $\overset{l}{36}$ | $\overset{k}{45}$ | $\overset{h}{51}$ | $\overset{e}{71}$ | 76 |

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

† The full names of divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average per cent of cloudiness for periods of years ending in each case with Dec. 31, 1893. The small figures above and at the right of numbers which state the per cent of cloudiness, denote the number of years included in the average.

NOTE TO TABLE VI.—Computations of average per cent of cloudiness were made and furnished by the observer at Albion by months in 1893. All other computations in Table VI. were made at the office of the State Board of Health.

§ This line is an average for only the stations at which tri-daily observations were made, and from which statements, nearly complete, were received for every month of the year. It does not include the lines for Rockland, Marshall, Tecumseh, Ashton and Albion.

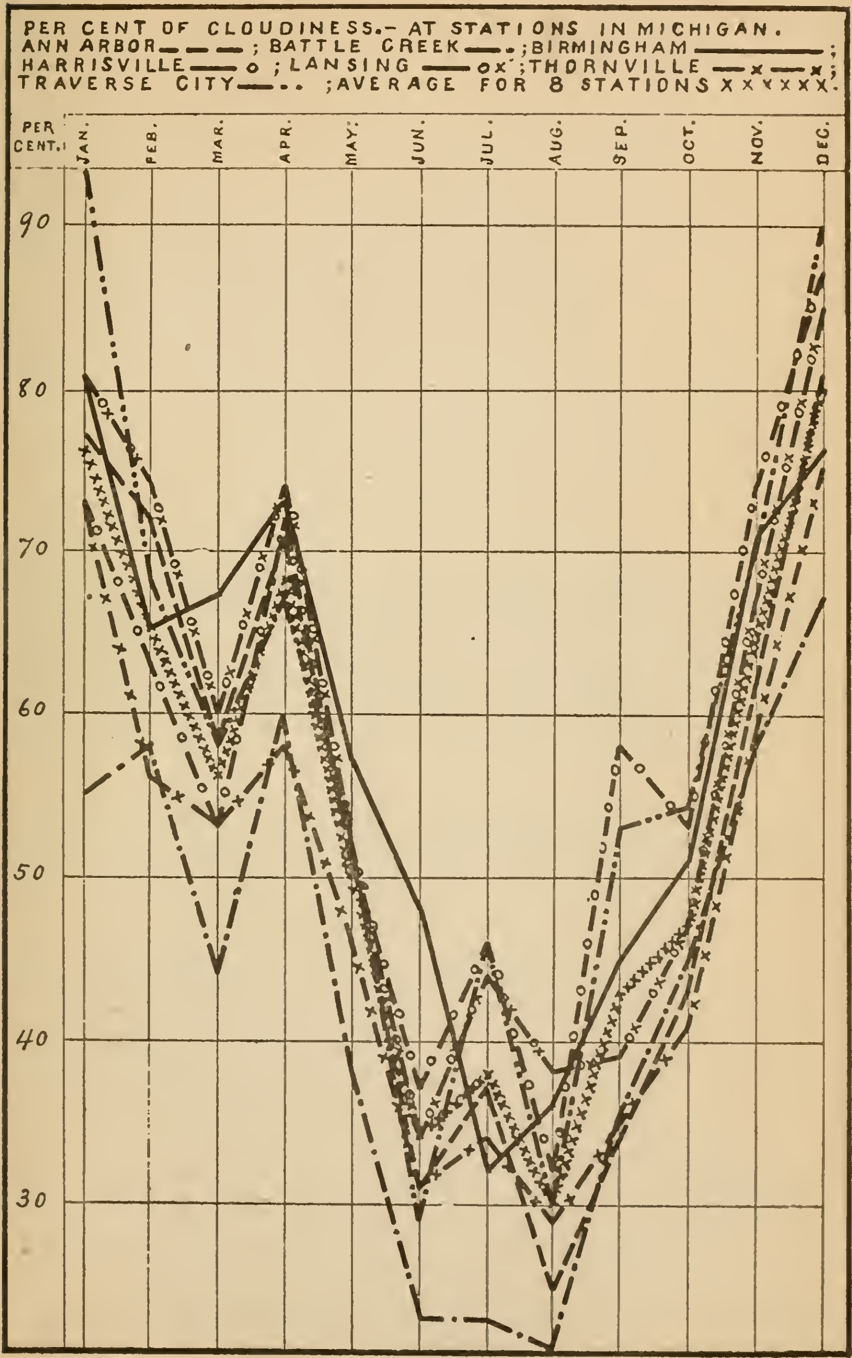
¶ The average for 11 months is 53. ** For 11 months, 32. †† For 11 months, 53. ‡‡ For 10 months, 43. ¶¶ For 8 months, 39.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

| | | | |
|---|---|---|---|
| a For 92 observations. | b For 91 observations. | c For 90 observations. | d For 89 observations. |
| e For 88 observations. | f For 87 observations. | g For 86 observations. | h For 85 observations. |
| i For 84 observations. | j For 83 observations. | k For 82 observations. | l For 81 observations. |
| m For 80 observations. | n For 72 observations. | o For 70 observations. | p For 68 observations. |

Graphic representations of 8 representative lines in Table VI., are given in Diagram No. VI., page 43.

DIAGRAM VI.— AV. PER CENT OF CLOUDINESS, BY MONTHS, 1893.



[Plate 748.]

EXHIBIT 24.—*Average Per Cent of Cloudiness, by Year and Months in 1893,* Compared with Annual and Monthly Averages for 1892, and for 16 years, 1877–92. These Averages are for Groups of Several Stations in Michigan.*

| Years, etc. | Per Cent of Cloudiness. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 16 years, 1877-92* | 56 | 70 | 65 | 58 | 51 | 50 | 49 | 40 | 43 | 44 | 58 | 69 | 74 |
| 1892 (11 stations) | 57 | 61 | 77 | 48 | 48 | 68 | 60 | 33 | 38 | 38 | 48 | 85 | 79 |
| 1893 (8 stations) | 54 | 76 | 65 | 56 | 68 | 50 | 34 | 38 | 30 | 43 | 47 | 65 | 80 |
| In 1893 Greater than Av. for 16 years, 1877-92 | ----- | 6 | 0 | ----- | 17 | 0 | ----- | ----- | ----- | ----- | ----- | ----- | 6 |
| In 1893 Less than Av. for 16 years, 1877-92 | 2 | ----- | 0 | 2 | ----- | 0 | 15 | 2 | 13 | 1 | 11 | 4 | ----- |
| In 1893 Greater than in 1892 | ----- | 15 | ----- | 8 | 20 | ----- | ----- | 5 | ----- | 5 | ----- | ----- | 1 |
| In 1893 Less than in 1892 | 3 | ----- | 12 | ----- | ----- | 18 | 26 | ----- | 8 | ----- | 1 | 20 | ----- |

* Mendon for 1877-83; Nirvana for 1877-79 and first four months of 1880; Reed City for last eight months of 1880 and 1881-85; Niles for 1878-81; Benton Harbor for 1877-78 and 1880; Coldwater, Woodmere Cemetery for 1877-79; Otisville for 1878-80, 1882; Washington for 1879-83; Ypsilanti for 1877, 1879; Petoskey for 1878-79; Fife Lake for 1877; Ionia for 1880, 1883-85; Adrian for 1880; Hillsdale for 1880, 1882-84; Parkville for 1881-82; Winfield for 1881, 1883; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hastings for 1882; Port Austin for 1883; Manistique, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Pentwater, East Saginaw for 1886; Kalamazoo for 1877-89; Marquette for 1879-87; Escanaba for 1880-87; Alpena, Grand Haven, Port Huron, for 1879-87; Detroit for 1877, 1879-87; Otsego for 1886-87, 1890; Gulliver Lake for 1887-90, 1892; Alma for 1890; Thornville for 1877-92; Battle Creek for 1877-80, 1882-85, 1888-89, 1891-92; Lansing for 1879-92; Agricultural College for 1877, 1881-92; Ann Arbor for 1880-92; Marshall for 1881-92; Harrisville for 1882, 1885-92; Traverse City for 1882-92; Birmingham for 1887-92; Albion for 1890-91; Rockland for 1891-92.

EXHIBIT 25.—*Comparison of the Average Per Cent of Cloudiness for the Year, and for each Month of the Year 1893, with Averages for the 29 Years, 1864–92, and for the Year 1892. Observations made at 7 A. M., 2 P. M. and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

| Years, etc. | Per Cent of Cloudiness. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 29 years, 1864-92 | 58 | 72 | 66 | 61 | 55 | 51 | 50 | 44 | 45 | 48 | 59 | 67 | 74 |
| 1892 | 58 | 63 | 79 | 52 | 50 | 70 | 59 | 32 | 37 | 41 | 42 | 82 | 83 |
| 1893 | 55 | 78 | 66 | 57 | 71 | 52 | 40 | 39 | 32 | 42 | 45 | 62 | 79 |
| In 1893 Greater than Av. for 29 years, 1864-92 | ----- | 6 | 0 | ----- | 16 | 1 | ----- | ----- | ----- | ----- | ----- | ----- | 5 |
| In 1893 Less than Av. for 29 years, 1864-92 | 3 | ----- | 0 | 4 | ----- | ----- | 10 | 5 | 13 | 6 | 14 | 5 | ----- |
| In 1893 Greater than in 1892 | ----- | 15 | ----- | 5 | 21 | ----- | ----- | 7 | ----- | 1 | 3 | ----- | ----- |
| In 1893 Less than in 1892 | 3 | ----- | 13 | ----- | ----- | 18 | 19 | ----- | 5 | ----- | ----- | 20 | 4 |

EXHIBIT 26.—*Dates of Auroras observed and recorded at 12 stations in Michigan during the year 1893.*

| Stations. | Dates of Auroras recorded in 1893. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Rockland | 21 | 14, 15, 16, 18, 19 | 7, 15, 27 | 14 | | | 15 | | | | 1 | 27, 29 |
| Marquette | 18, 19 | 15 | | | 4, 7, 9 | 18 | 15 | 6, 12, 18 | | | 1 | |
| Sault Ste. Marie | | | 3 | 14 | | | 15 | 8 | | 1, 2, 5, 7, 8 | 1 | 29 |
| Alpena | 19 | | | | 7, 9 | | 15 | | | | | |
| Grand Haven | 12 | 15 | | | | | 15 | | | | 1 | |
| Ashton | | | | | | | 15 | | | | | |
| Thornville | | | | | | | 15 | 12 | 7, 8 | | 1 | |
| Lansing, S. B. of H. | | | | | 7 | | 15 | | | | 1 | |
| Albion | | | | | | 18 | 15 | 6 | | | 1 | |
| Ann Arbor | | 15 | | | | | | | | | | |
| Parkville | | | | | | | 15 | | | | | |
| Detroit | | | | | | | 15 | | | | | |

EXHIBIT 27.—*Dates of Solar and Lunar Halos*

| Line number. | Stations. | Dates of Halos Recorded, | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | January. | | February. | | March. | | April. | | May. | |
| | | Solar. | Lunar. | Solar. | Lunar. | Solar. | Lunar. | Solar. | Lunar. | Solar. | Lunar. |
| 1 | Marquette | ------ | 27 | 4, 8, 12, 17, 24 | 22, 24 26, 28 | 2, 4, 8, 18 | -------- | -------- | -------- | -------- | ------ |
| 2 | Sault Ste. Marie | ----- | 26 | --------- | 24, 28 | 2 | 1 | 21, 22, 23, 30 | 22, 23, 25 | 1, 8 | 1, 21 |
| 3 | Alpena | ----- | ------ | --------- | ------- | --------- | -------- | -------- | -------- | 20 | 24 |
| 4 | Grand Haven | ------ | ------ | --------- | 22 | 17, 27 | 27, 30 | -------- | 25 | -------- | 30 |
| 5 | Lansing, S. B. of H. | 12 | ------ | 19, 20, 26 | ------- | 13 | 30 | -------- | 27 | 20, 31 | 24 |
| 6 | Albion | ------ | ------ | --------- | ------- | 17, 28 | 29 | -------- | -------- | -------- | ------ |
| 7 | Ann Arbor | ------ | ----- | --------- | ------- | --------- | 27 | -------- | -------- | -------- | ------ |
| 8 | Kalamazoo | ------ | ------ | --------- | ------- | 6, 17 | 27 | -------- | -------- | -------- | ------ |
| 9 | Parkville | ------ | ----- | --------- | ------- | --------- | -------- | -------- | 27 | -------- | ------ |
| 10 | Detroit | ------ | ------ | --------- | 2, 27 | --------- | -------- | -------- | 25 | -------- | 26 |

Parhelia, Jan. 6, 9, 20; Feb. 8; Mar. 8, 17, 27; May 10; June 25; Oct. 1; Dec. 27.—*Lansing.*
Parhelia, Mar. 27.—*Kalamazoo.*

EXHIBIT 28.—*Inches of Rain and Melted Snow, by Year and Months in 1893, compared with Annual and Monthly Averages for 1892, and for the 16 Years, 1877-92. These Averages are for Groups of several Stations in Michigan.*

| Years, etc. | Inches of Rain and Melted Snow. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 16 years, 1877-92* | 35.40 | 2.23 | 2.58 | 2.26 | 2.47 | 3.50 | 3.93 | 3.13 | 3.25 | 3.15 | 3.17 | 3.17 | 2.60 |
| 1892 (18 stations) | 33.08 | 1.95 | 2.16 | 1.39 | 2.16 | 5.45 | 5.17 | 2.39 | 2.92 | 3.01 | 1.40 | 3.14 | 1.95 |
| 1893 (16 stations) | 36.34 | 2.34 | 2.78 | 2.40 | 4.77 | 2.91 | 3.55 | 2.83 | 1.22 | 2.52 | 4.24 | 3.05 | 3.74 |
| In 1893 Greater than Av. for 16 years, 1877-92 | .94 | .11 | .20 | .14 | 2.30 | ------ | ------ | ------ | ------ | ------ | 1.07 | ------ | 1.14 |
| In 1893 Less than Av. for 16 years, 1877-92 | -------- | ------ | ------ | ------ | ------ | .59 | .38 | .30 | 2.03 | .63 | ------ | .12 | ------ |
| In 1893 Greater than in 1892 | 3.26 | .39 | .62 | 1.01 | 2.61 | ------ | ------ | .44 | ------ | ------ | 2.84 | ----- | 1.79 |
| In 1893 Less than in 1892 | -------- | ------ | ------ | ------ | ------ | 2.54 | 1.62 | ------ | 1.70 | .49 | ------ | .09 | ------ |

---

* Benton Harbor for 1877-78; Mendon for 1877-78, 1880-82; Niles for 1878-81; Nirvana for 1877-79, and to and including April 25, 1880; Reed City from April 26 to December 31 inclusive in 1880, and for 1881-85; Coldwater, Woodmere Cemetery for 1877-79; Otisville for 1878-80, 1882; Escanaba for 1880-87; Washington for 1880-83; Fife Lake, Ypsilanti for 1887; Winfield for 1881-83; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hastings for 1882; Hillsdale for 1882-84; Ionia for 1883-84; Manistique, Swartz Creek for 1884-85; Mackinaw City for 1884-87; Pentwater, East Saginaw for 1886; Gulliver

*Recorded on the Monthly Registers in 1893.*

| Months, 1893. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| June. | | July. | | August. | | September. | | October. | | November. | | December. | | Line number. |
| Solar. | Lunar. | Solar. | Lunar. | Solar. | Lunar. | Solar. | Lunar. | Solar. | Lunar. | Solar. | Lunar. | Solar. | Lunar. | |
| ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 1 |
| 1, 10 | 7 | ------ | ------ | ------ | ------ | 17 | ------ | 17 | ------ | ------ | 18, 23 | ------ | ------ | 2 |
| ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 3 |
| ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 25 | ------ | 18 | ------ | ------ | 4 |
| ------ | ------ | ------ | ------ | 14, 15 | 25 | 29 | ------ | 1, 31 | 19, 25 | 3, 11 | 20 | 7 | ------ | 5 |
| ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 21 | ------ | ------ | ------ | ------ | 6 |
| ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 7 |
| ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 8 |
| ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 9 |
| ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 19, 22 | ------ | ------ | ------ | ------ | 10 |

Parhelia, Feb. 26, 27.—*Parkville.*
Parhelia, Dec. 2.—*Rockland.*

EXHIBIT 29.—*Comparison of the Rainfall during the Year and during each Month of the year 1893, with that for the Year 1892, and with the Average for the 29 Years, 1864–92. Observations made by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

| Years, etc. | Inches of Rain and Melted Snow. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 29 years, 1864–92 | 31.40 | 1.80 | 2.05 | 2.40 | 2.34 | 3.23 | 4.05 | 3.16 | 2.88 | 2.83 | 2.48 | 2.30 | 1.90 |
| 1892 | 29.92 | .96 | 1.93 | 1.31 | 2.04 | 5.92 | 4.83 | 2.00 | 5.12 | 2.17 | .78 | 1.84 | 1.52 |
| 1893 | 31,29 | 1.78 | 1.83 | 2,82 | 4.81 | 2.86 | 4.85 | 1.86 | .56 | 1.84 | 3.61 | 2.19 | 2.28 |
| In 1893 Greater than Av. for 29 years, 1864–92 | ------ | ------ | ------ | .42 | 2.47 | ------ | .80 | ------ | ------ | ------ | 1.13 | ------ | .38 |
| In 1893 Less than Av. for 29 years, 1864–92 | .11 | .02 | .22 | ------ | ------ | .37 | ------ | 1.30 | 2.32 | .99 | ------ | .11 | ------ |
| In 1893 Greater than in 1892 | 1.37 | .82 | ------ | 1.51 | 2.77 | ------ | .52 | ------ | ------ | ------ | 2.83 | .35 | .76 |
| In 1893 Less than in 1892 | ------ | ------ | .10 | ------ | ------ | 3.06 | ------ | .14 | 4.56 | .33 | ------ | ------ | ------ |

Lake for 1887-90, 1892; Alma, Otsego for 1890; Hudson for 1886, 1888-89; Battle Creek for 1877-78, 1884, 1888; Thornville, Detroit for 1877-92; Kalamazoo for 1877-90, 1892; Agricultural College for 1877-78, 1881-92; Marquette for 1879-84, 1886-92; Alpena, Port Huron for 1879-92; Grand Haven for 1879-88, 1890-92; Lansing for 1880-92; Harrisville for 1881-82, 1887-92; Ann Arbor for 1881-82, 1885-86, 1888-92; Marshall for 1881-84, 1886-92; Traverse City for 1882-92; Parkville for 1882-83, 1885-92; Birmingham for 1887-92; Manistee for 1889-92; Albion for 1890-91; Rockland for 1891; Sault Ste. Marie for 1892.

TABLE VII.—*Inches of Rain and Melted Snow for Months and Year 1893, at 22 Stations in Michigan; Also Average Line for 16 Stations,—as compiled from daily observations made by observers* for the State Board of Health, and for the U. S. Weather Bureau.*

| Stations in Michigan * (Those of the U. S. Weather Bureau in Italics.) | Divisions of the State † | Inches of Rain and Melted Snow. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year. | | Months, 1893. | | | | | | | | | | | |
| | | Norm. ‡ | 1893. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. for 16 stations § | ------- | ----- | 36.34 | 2.34 | 2.78 | 2.40 | 4.77 | 2.91 | 3.55 | 2.83 | 1.22 | 2.52 | 4.24 | 3.05 | 3.74 |
| Rockland | U. P. | ------ | ‖ | ----- | ----- | 1.40 | ----- | ----- | 2.58 | 2.91 | 2.45 | 1.55 | 2.98 | 0.80 | 4.50 |
| *Marquette* | U. P. | $31.51^{8}$ | 35 86 | 2.27 | 1.93 | 3.00 | 2.31 | 3.89 | 1.38 | 5.22 | 2.56 | 0.53 | 2,92 | 3.96 | 5.89 |
| *Sault Ste: Marie* | U. P. | $34.83^{2}$ | 39.56 | 1.79 | 1.77 | 1.77 | 3.36 | 3.71 | 2.15 | 4.32 | 1.40 | 4.68 | 4.68 | 5.09 | 4.84 |
| *Manistee* | N. W. | ----- | ¶ | 2.51 | 1.85 | 1.69 | 3.71 | 2.55 | 1.90 | 3.27 | 1.07 | ----- | ----- | ----- | ----- |
| Traverse City | N. W. | $38.37^{12}$ | 38.63 | 3.84 | 2.88 | 2.11 | 4.09 | 1.95 | 1.52 | 5.08 | 1.07 | 3.80 | 4.61 | 3.00 | 4.68 |
| *Alpena* | N. E. | $36\ 05^{21}$ | 33.35 | 2.20 | 1.46 | 2.09 | 3.03 | 3.24 | 2.71 | 1.93 | 2.00 | 3.75 | 5.57 | 1.95 | 3.42 |
| Harrisville | N. E. | $33.87^{7}$ | 38.22 | 3.27 | 3.23 | 2.63 | 5.78 | 3.16 | 1.70 | 2.29 | 1.88 | 3.13 | 4.73 | 2.11 | 4.31 |
| Grand Haven | W. | $30.62^{4}$ | 32.17 | 1.33 | 2.17 | 2.47 | 4.53 | 2.57 | 3.12 | 3.10 | 0.57 | 3.50 | 2.53 | 2.65 | 3.63 |
| Ashton | N. C. | ------ | ** | 1.81 | 1.84 | 0.92 | 4.65 | 1.79 | 2.16 | 4.12 | 1.22 | 3.06 | 4.36 | 1.63 | ----- |
| *Port Huron* | B. & E. | $32.42^{19}$ | 34.79 | 2.24 | 3.57 | 1.47 | 3.71 | 2.50 | 4.43 | 2.04 | 2.15 | 0.90 | 5.25 | 3.00 | 3.53 |
| Thornville | B. & E. | $33.46^{17}$ | 32.34 | 2.71 | 2.16 | 1.33 | 5.29 | 1.33 | 3.90 | 2.68 | 0.92 | 0.98 | 4.64 | 3.15 | 3.25 |
| Agricultural College | C. | $31.39^{30}$ | 31.29 | 1.78 | 1.83 | 2.82 | 4.81 | 2.86 | 4.85 | 1.86 | 0.56 | 1.84 | 3.61 | 2.19 | 2.28 |
| Lansing, S. B. of H. | C. | $34.07^{14}$ | 39.52 | 1.84 | 2.31 | 3.78 | 5.30 | 4.08 | 7.19 | 0.98 | 0.73 | 2.34 | 4.55 | 2.46 | 3.96 |
| Albion | S. C. | ---- | †† | 1.89 | 3.26 | 3.83 | 6.48 | 2.69 | 4.63 | 2.32 | 0 47 | ----- | 3.80 | 3.26 | 4.68 |
| Ann Arbor | S. C. | $31.76^{6}$ | 41.14 | 3 71 | 4.25 | 2.21 | 6.25 | 1.62 | 4.04 | 2.47 | 0.65 | 1.36 | 5.29 | 3.38 | 5.91 |
| Battle Creek | S. C | ----- | ‡‡ | 1.43 | 2.40 | 4.05 | 5.15 | 3.36 | 2.60 | 1.15 | 0.70 | 1.50 | 1.70 | 1.30 | ----- |
| Kalamazoo | S. C. | $34.04^{2}$ | 34.76 | 1.53 | 2.35 | 2.89 | 5.32 | 4.42 | 2.92 | 3.17 | 0.75 | 3.47 | 3.06 | 2.09 | 2.79 |
| Marshall | S. C. | ---- | 39.66 | 2.53 | 3.93 | 2.40 | 6.22 | 2.75 | 4.17 | 3.16 | 0.73 | 3.95 | 3.71 | 3.51 | 2.60 |
| Parkville | S. C. | $43.65^{13}$ | 42.23 | 2.07 | 3.46 | 4.08 | 7.63 | 4.62 | 3.61 | 3.36 | 0.53 | 3.45 | 3.05 | 3.26 | 3.11 |
| Tecumseh | S. C. | ------ | ¶¶ | ---- | ---- | ----- | ----- | ----- | 2.28 | 2.25 | 0.47 | 1.79 | 4.41 | 4.15 | 3.51 |
| Birmingham | S. E. | $31.57^{7}$ | 33.69 | 2.56 | 3.14 | 1.96 | 5.00 | 2.37 | 4.50 | 1.13 | 1.19 | 1.20 | 4.89 | 3.28 | 2.47 |
| *Detroit* | S. E. | $33.21^{22}$ | 34.18 | 1.77 | 4 05 | 1.36 | 3.61 | 1.50 | 4.66 | 2.50 | 1.78 | 1.37 | 4.77 | 3.68 | 3.13 |

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

† The names of divisions, and the counties in each, are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

‡ Numbers in this column state the annual average rainfall for periods of years ending in each case with December 31, 1893. The small figures above and at the right of numbers which state the rainfall denote the number of years included in the average.

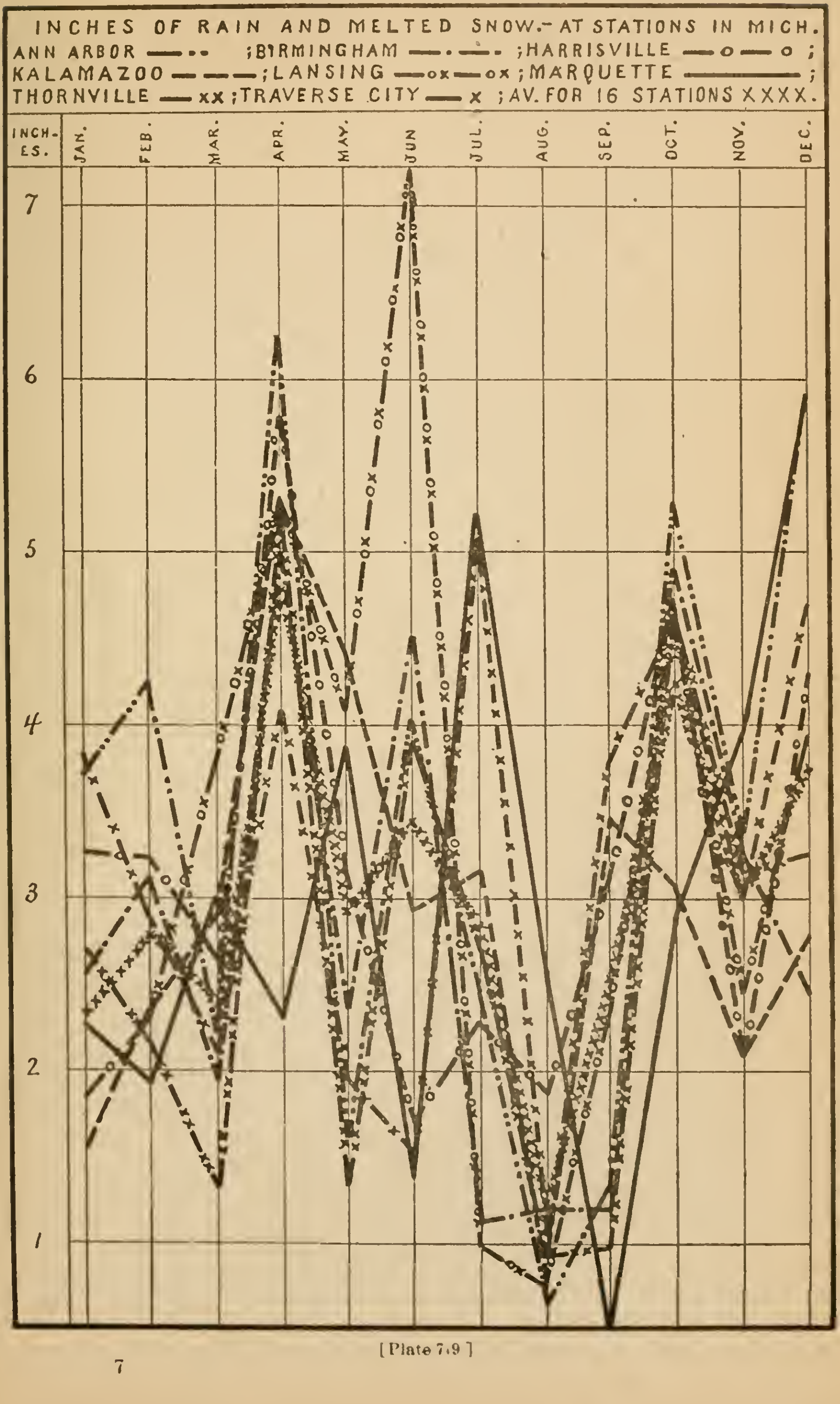
§ This line is an average for only the stations from which statements, nearly complete, are given for every month of the year. It does not include Rockland, Ashton, Albion, Manistee, Battle Creek and Tecumseh.

‖ The total rainfall for 8 months is 19.17 inches. ¶ For 8 months, 18.55 inches. ** For 11 months, 27.56 inches. †† For 11 months, 37.81 inches. ‡‡ For 11 months, 25.34 inches. ¶¶ For 7 months, 18.86.

NOTE.—The computations of amount of rainfall were furnished by the observers at Detroit, Alpena, Grand Haven, Port Huron, Ann Arbor, Manistee, Albion, Kalamazoo, Sault Ste. Marie and Marquette for the year. All other computations in Table VII., were made in the office of the Secretary of the State Board of Health.

The lines for 8 representative stations in Table VII., are graphically represented in Diagram VII., page 49.

DIAGRAM VII.- RAINFALL, BY MONTHS IN 1893.



[Plate 7.9]

TABLE VIII.—*Relative amount of Ozone in the Atmosphere by Day, for Months and Year 1893, at 17 Stations, also Average Lines for 5 Stations and for Stations in Michigan, as indicated by averages of observations made daily by exposing Test-paper prepared according to Schönbein's formula, from 7 A. M. to 2 P. M.—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10) by observers for the State Board of Health, and for the U. S. Weather Bureau.**

| Stations in Michigan † (Those of the U. S. Weather Bureau in Italics.) | Divisions of the State † | Degrees of Coloration of Test-paper—Day Observation.** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year. | | Months, 1893. | | | | | | | | | | | |
| | | Norm. ‡ | 1893. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sept. | Oct. | [h] Nov. | Dec. |
| Av. for 5 stations § | -------- | ---- | 3.91 | 4.02 | 4.54 | 4.30 | 3.92 | 4.18 | 3.98 | 3.50 | 4.56 | 3.34 | 3.70 | 3.03 | 3.81 |
| Av. for 4 stations ‖ | ------- | ------ | 3.29 | 2.86 | 3.02 | 3.53 | 3.73 | 3.73 | 4.24 | 3.18 | 4.50 | 3.07 | 3.03 | 1.82 | 2.83 |
| Rockland | U. P. | ---- | ¶ | [c] 6.63 | [g] 6.01 | [b] 6.02 | [d] 5.93 | ---- | 5.60 | [b] 5.20 | [g] 6.04 | [c] 5.42 | 5.79 | 5.69 | [e] 2.62 |
| *Marquette* | U. P. | ----- | 3.94 | 3.57 | 3.76 | 4.08 | 4.55 | 3.63 | 4.98 | 4.14 | 6.55 | 3.28 | 3.87 | 1.48 | 3.35 |
| *Manistee* | N. W. | ------ | †† | 2.89 | 3.65 | 4.12 | 4.17 | 4 67 | ---- | 4.46 | 4.63 | ----- | ----- | ----- | ----- |
| Traverse City | N. W. | $4.67^{12}$ | 6.71 | 6.76 | 6.68 | 6.73 | 6.64 | 7.18 | 7.27 | [a] 6.74 | 7.50 | 6.18 | 6.40 | 6 06 | 6.34 |
| *Alpena* | N. E. | ------ | 3.48 | 4.54 | 4.11 | 3 60 | 3.77 | 4.09 | 4.10 | 2.30 | 2.60 | 3.04 | 3.21 | 2 66 | 3.69 |
| Harrisville | N. E. | $4.13^{9}$ | 3.40 | 4.28 | 3.90 | 3.66 | 3 30 | 3.44 | 2.80 | 2.98 | 3.85 | 2.98 | 3.43 | 2.76 | 3.40 |
| *Grand Haven* | W. | ----- | 4.44 | 2.05 | 3.18 | 5.05 | 5.34 | 5.35 | 5.49 | 4.92 | 6.31 | 4.58 | 4.47 | 3.14 | 3.37 |
| Ashton | N. C. | ------ | ‡‡ | 6.57 | 6.47 | 5.76 | 5.14 | 4.41 | 4.00 | 3.46 | 4.66 | 4.01 | 4 95 | 5.56 | ----- |
| *Port Huron* | B. & E. | ------ | 1 32 | 1.28 | 1.04 | 1.37 | 1.24 | 1.83 | 2.37 | 1.37 | 2.53 | 1.38 | 0.56 | 0 | 0.92 |
| Thornville | B. & E. | $2.98^{17}$ | 3 92 | 4.25 | 5.54 | 4.99 | 4.17 | 3.38 | 3.07 | 2.56 | 3.40 | 2.71 | 3 82 | 3.79 | 5.40 |
| Lansing, S. B. of H. | C. | $3.21^{15}$ | 2.77 | 3 02 | 3.51 | 2.73 | 2.80 | 3.60 | 3.27 | 1.72 | 3.53 | 2.51 | 2 92 | 1 52 | 2.15 |
| Albion | S. C. | ---- | §§ | 2.54 | 2.95 | 2.44 | 3.50 | 3.54 | [c] 3.84 | [f] 3.71 | 4 92 | ----- | 2.76 | 1.82 | 3.31 |
| Ann Arbor | S. C. | ------ | 2.73 | 1 80 | [d] 3.08 | 3.41 | 2.67 | 3.31 | 3.47 | 3.50 | 4.50 | 2.34 | 1.92 | 1.02 | 1.76 |
| Battle Creek | S. C. | ----- | 3.62 | 4.73 | 5.83 | 4.86 | 5.42 | 4.67 | 3.10 | 2.59 | [a] 3.65 | [b] 2.76 | 2.34 | 0.22 | 3.24 |
| Marshall | S. C. | ----- | ‖‖ | 1.67 | 3.51 | 3 37 | 3.44 | 3.41 | 2.57 | 0.95 | 2.82 | 2.58 | 2.90 | ----- | ----- |
| Tecumseh | S. C. | ------ | ¶¶ | .. | -- - | -- - | ----- | ---- | [d] 3 00 | 4.46 | 4.85 | 3.51 | 4.82 | 4.09 | 4.95 |
| Birmingham | S. E. | ------ | A | [a] 2.73 | 2.79 | 2.15 | 2.94 | 2.60 | ---- | 1.72 | 2.73 | 2.11 | 2.34 | 1.89 | 2.47 |

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* At the stations of the U. S. Weather Bureau and Kalamazoo during the year 1893, the observations were made by exposing the test-paper from 8 A. M. to 8 P. M., all 75th meridian time. The corresponding local time for some of these stations is stated in a foot note to Table II., page 22.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2. The full names of the divisions and the counties in each division are stated in Exhibit 1., in a paper which follows, on weekly reports of sickness.

‡ Numbers in this column state the average annual relative amount of ozone by day for periods of years ending in each case with December 31, 1893. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

§ This line is an average for only the stations from which statements, nearly complete, were received for every month in the year. It does not include Birmingham, Ashton, Albion, Rockland, Battle Creek, Marshall, Tecumseh, and the Weather Bureau Stations.

‖ This is an average line for Alpena, Grand Haven, Marquette, and Port Huron.

¶ The average for 11 months is 5.54. †† For 7 months, 4.08. ‡‡ For 11 months, 5.00. §§ For 11 months, 3.21. ‖‖ For 10 months, 2.72. ¶¶ For 7 months, 4.24. A For 11 months, 2.41.

** Allowance has been made for difference in sensitiveness of test-paper. See "h" below.

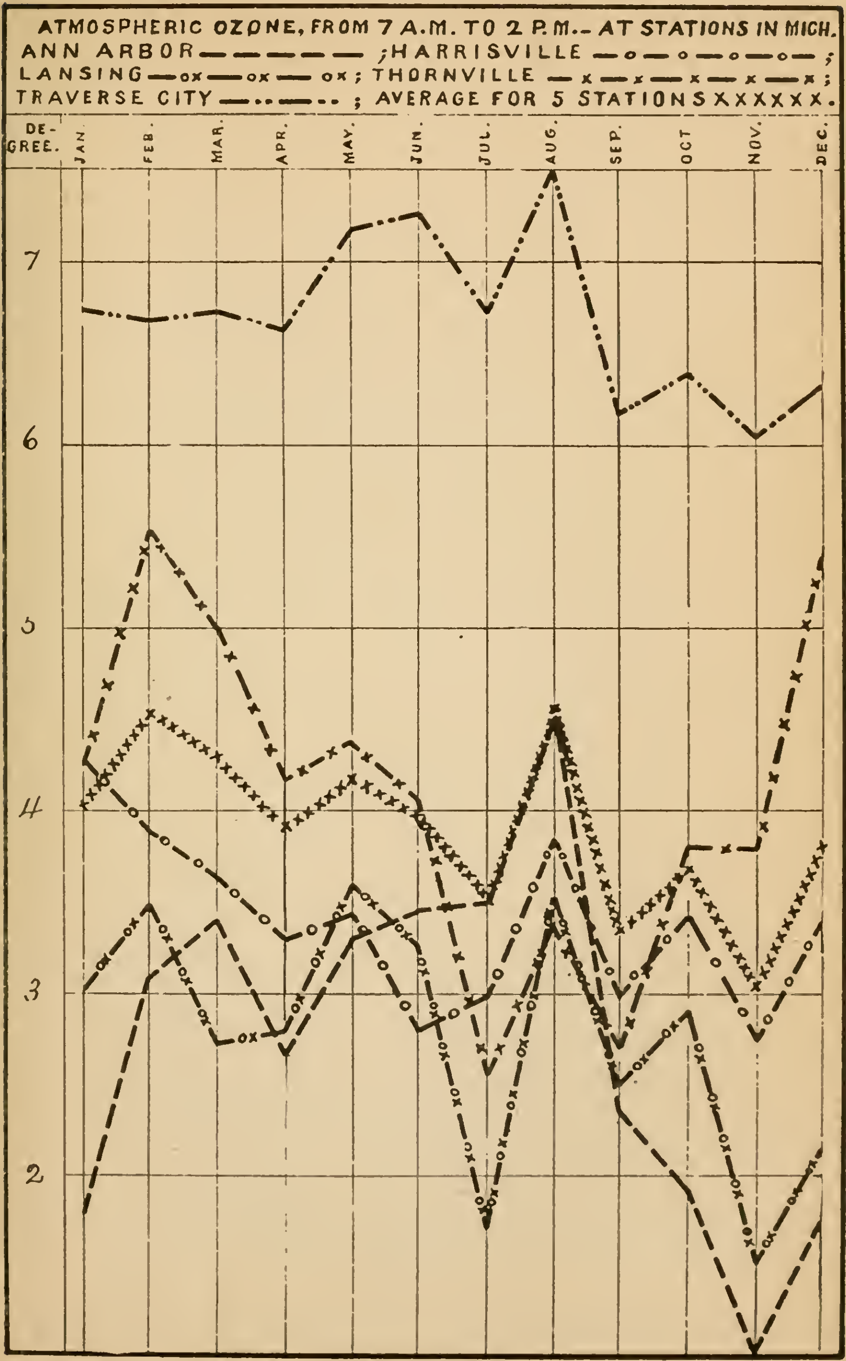
a, b, c. In the columns from January to December, inclusive, the a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 26 days. f for 25 days. g For 24 days.

h CONCERNING OZONE CORRECTIONS.—It is now believed that the correction (for variation in sensitiveness of different lots of test-paper) applied to the monthly averages in the tables for the day and the night ozone, for the month of November in each of the years 1891, 1892, and 1893, at stations in Michigan and at Lansing, was .39 too great for the day (7 A. M. to 2 P. M.) and .54 for the night ozone (2 P. M. to 9 P. M.). This should be taken into consideration in studying the tables relative to ozone in the Annual Reports of this Board for those years.

Six lines in this table graphically represented in Diagram VIII, page 51.

DIAGRAM VIII.—OZONE, AVERAGE BY DAY, MONTHS IN 1893.



[Plate 750.]

TABLE IX.—*Relative Amount of Ozone in the Atmosphere at Night for Months and Year 1893, at 17 Stations, also Average Lines for 5 Stations and for 4 Stations in Michigan,—as indicated by Averages of Observations made Nightly by exposing Test-paper, prepared according to Schönbein's formula, from 9 P. M. to 7 A. M.,—Recorded according to a scale of 10 Degrees of Coloration of the Test-paper (greatest coloration by Ozone equals 10), by observers for the State Board of Health, and for the U. S. Weather Bureau.**

| Stations in Michigan.† (Those of the U. S. Weather Bureau in Italics.) | Divisions of the State. ‡ | Degrees of Coloration of Test-paper.—Night Observation.** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year. | | Months, 1893. | | | | | | | | | | | |
| | | Norm. § | 1893. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
| Av. for 5 stations ‖ | -------- | ------ | 4.20 | 4.03 | 4.92 | 4.92 | 4.62 | 4.55 | 4.15 | 3.66 | 4.56 | 3.24 | 3.91 | 3.28 | 4.53 |
| Av. for 4 stations ¶ | -------- | ------ | 3.29 | 2.75 | 3.83 | 3.66 | 3.45 | 3.50 | 3.36 | 3.09 | 4.10 | 2.69 | 3.64 | 1.82 | 3.56 |
| Rockland | U. P. | ------ | †† | [g] 6.81 | [e] 7.16 | [a] 6.77 | [e] 7.01 | ----- | 6.31 | [b] 6.09 | [f] 6.73 | [c] 5.59 | [a] 6.13 | 6.09 | [e] 3.05 |
| *Marquette* | U. P. | ------ | 4.25 | 2.96 | 4.08 | 3.73 | 3.83 | 4.38 | 4.61 | 4.20 | 6.17 | 3.44 | 6.23 | 2.86 | 4.47 |
| *Manistee* | N. W. | ------ | ‡‡ | 2.47 | 4.40 | 4.76 | 4.27 | 4.48 | ----- | 4.51 | 4.56 | ----- | ----- | ----- | ----- |
| Traverse City | N. W. | 4.63[12] | 6.52 | 6.37 | 6.47 | 6.79 | 6.47 | 6.93 | 6.84 | 6.74 | 7.27 | 5.81 | 5.95 | 5.79 | [a] 6.83 |
| *Alpena* | N. E. | ------ | 4.05 | 5.08 | 5.58 | 4.63 | 4.14 | 4.32 | 3.38 | 2.74 | 3.10 | 3.94 | 4.24 | 2.62 | 4.80 |
| Harrisville | N. E. | 4.70[9] | 3.75 | 4.25 | 4.69 | 4.73 | 4.00 | 3.67 | 3.28 | 2.71 | 3.78 | 3.24 | 3.72 | 2.86 | 4.02 |
| *Grand Haven* | W. | ------ | 3.34 | 1.92 | 4.01 | 4.42 | 3.87 | 3.54 | 3.41 | 3.53 | 4.67 | 2.24 | 3.22 | 1.64 | 3.55 |
| Ashton | N. C. | ------ | §§ | 6.28 | 6.58 | 6.02 | 5.60 | 4.57 | 4.44 | 4.16 | 5.14 | 4.41 | 5.11 | 5.52 | ----- |
| *Port Huron* | B. & E. | ----- | 1.52 | 1.02 | 1.65 | 1.86 | 1.94 | 1.77 | 2.04 | 1.90 | 2.46 | 1.14 | 0.85 | 0.16 | 1.41 |
| Thornville | B. & E. | 3.60[17] | 4.96 | 4.76 | 6.22 | 6.40 | 5.00 | 5.38 | 4.41 | 3.96 | 4.65 | 3.71 | 4.75 | 4.36 | 5.93 |
| Lansing, S. B. of H. | C. | 3.56[15] | 3.07 | 2.92 | 4.26 | 3.05 | 3.94 | 3.77 | 3.31 | 2.00 | 3.20 | 2.21 | 2.95 | 2.12 | 3.09 |
| Albion | S. C. | ------ | ‖‖ | [a] 1.91 | 3.72 | 3.80 | 4.40 | 3.93 | 3.78 | [a] 3.21 | 4.10 | ----- | 2.69 | 1.99 | 4.28 |
| Ann Arbor | S. C. | ------ | 2.68 | 1.83 | 2.97 | 3.63 | 3.67 | 3.02 | 2.91 | 2.87 | 3.88 | 1.21 | 2.17 | 1.29 | 2.76 |
| Battle Creek | S. C. | ----- | 3.11 | 3.79 | 4.22 | 5.18 | 5.04 | 4.86 | 2.54 | 2.88 | 2.98 | [b] 0.62 | 1.04 | 0.82 | 3.90 |
| Marshall | S. C. | ------ | A | 1.57 | 3.58 | 3.89 | 4.17 | 2.96 | 2.48 | 1.16 | 2.56 | [b] 2.41 | 1.82 | ----- | ----- |
| Tecumseh | S. C. | ------ | B | ----- | ----- | ----- | ----- | ----- | [d] 4.33 | 5.45 | 5.94 | 4.44 | 4.49 | 4.62 | 6.28 |
| Birmingham | S. C. | ------ | C | [a] 1.91 | 3.15 | 2.21 | 2.94 | 2.54 | ----- | 2.03 | 2.85 | 2.18 | 2.46 | 2.02 | 2.67 |

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* At the U. S. Weather Bureau Stations and Kalamazoo during the year 1893, the observations were made by exposing the test-paper from 8 P. M. to 8 A. M., 75th meridian time. The corresponding local time for some of these stations is stated in a foot-note to table II., page 22.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

‡ The full names of the divisions and the counties in each division are stated in Exhibit I., in a paper which follows on weekly reports of sickness.

§ Numbers in this column state the average annual relative amount of ozone by night for periods of years ending in each case with December 31, 1893. The small figures above and at the right of the numbers which state the average, denote the number of years included in the average.

‖ This line is an average for only the stations from which statements, nearly complete, were received for every month in the year. It does not include Ashton, Albion, Rockland, Birmingham, Battle Creek, Marshall, Tecumseh, and the U. S. Weather Bureau Stations.

¶ This is an average line for Marquette, Alpena, Grand Haven, and Port Huron.

** Allowance has been made for difference in sensitiveness in test-paper. See "h" foot-note, Table VIII., page 50.

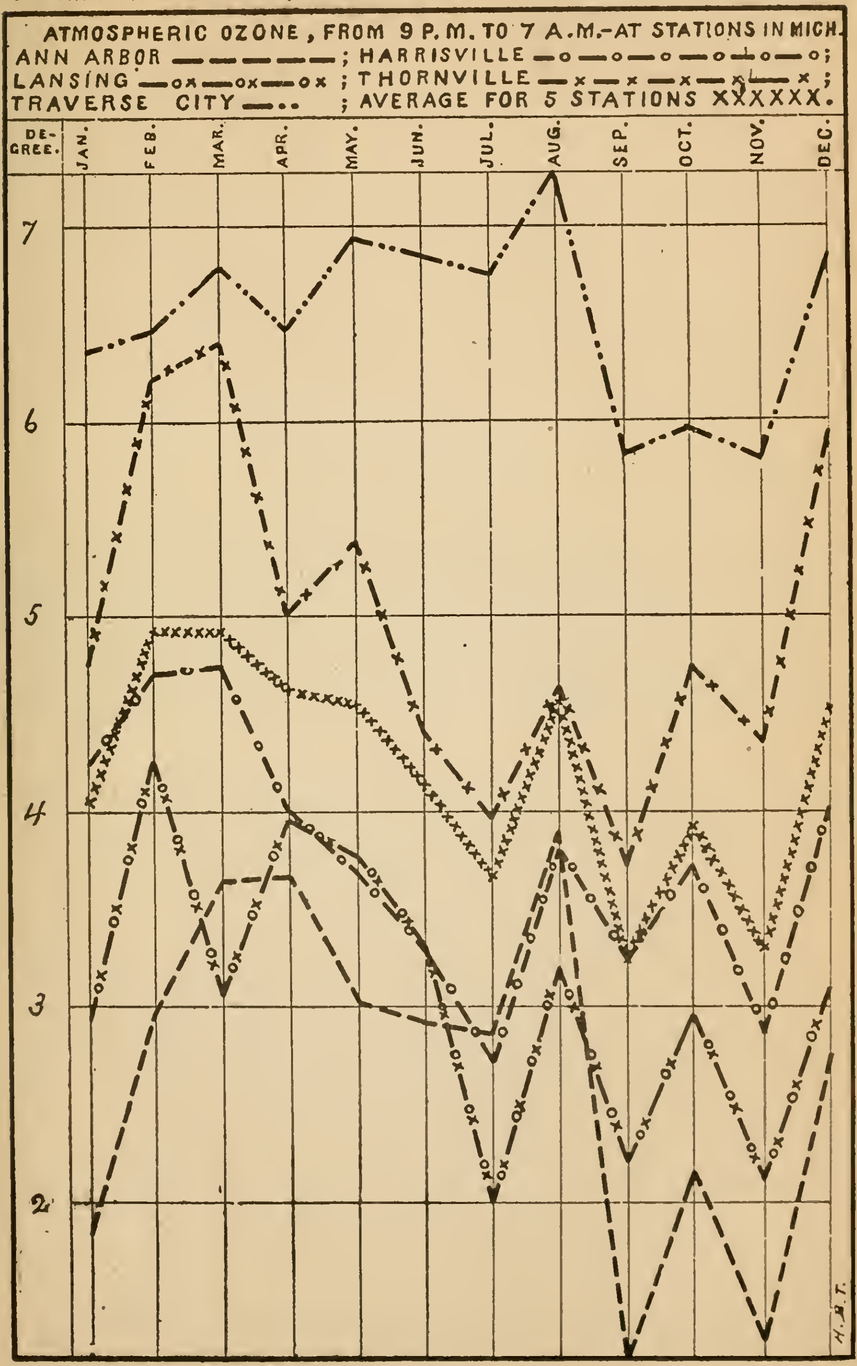
†† The average for 11 months is 6.16. ‡‡ For 7 months, 4.21. §§ For 11 months, 5.26. ‖‖ For 11 months, 3.44. A For 10 months, 2.66. B For 7 months, 5.08. C For 11 months, 2.45.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d for 27 days. e For 26 days. f For 25 days. g For 24 days.

Six lines in this table graphically represented in Diagram IX., page 53.

DIAGRAM IX.—OZONE, AVERAGE BY NIGHT, MONTHS IN 1893.



[Plate 751.]

EXHIBIT 30.—*Average Amount of Atmospheric Ozone (Day), by Year and Months, in 1893, compared with Annual and Monthly Averages for 1892, and for the 16 Years, 1877-92. These Averages are for Groups of several Stations in Michigan.*

| Years, etc. | Ozone by Day.—Degrees of Coloration of Test-paper.† | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 16 years, 1877-92* | 3.38 | 3.57 | 3.65 | 3.70 | 3.52 | 3.60 | 3.41 | 2.99 | 3.24 | 3.13 | 3.13 | 3.13 | 3.43 |
| 1892 (7 stations) | 3.95 | 4.29 | 4.32 | 4.18 | 3.58 | 4.24 | 4.39 | 3.60 | 4.52 | 3.56 | 3.69 | 3.23 | 3.83 |
| 1893 (5 stations) | 3.91 | 4.02 | 4.54 | 4.30 | 3.92 | 4.18 | 3.98 | 3.50 | 4.56 | 3.34 | 3.70 | 3.03 | 3.81 |
| In 1893 Greater than Av. for 16 years, 1877-92 | .53 | .45 | .89 | .60 | .40 | .58 | .57 | .51 | 1.32 | .21 | .57 | ...... | .38 |
| In 1893 Less than Av. for 16 years, 1877-92 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | .10 | ...... |
| In 1893 Greater than in 1892 | ...... | ...... | .22 | .12 | .34 | ...... | ...... | ...... | .04 | ...... | .01 | ...... | ...... |
| In 1893 Less than in 1892 | .04 | .27 | ...... | ...... | ...... | .06 | .41 | .10 | ...... | .22 | ...... | .20 | .02 |

* Mendon for 1877-83; Niles for 1878-81; Nirvana for 1877-79 and to and including April 25, 1880; Reed City for April 26 to end of year 1880 and for 1881-85; Coldwater, Agricultural College for 1877-78, 1880; Otisville for 1878-80; Washington for 1879-83; Petoskey, Woodmere Cemetery for 1878-79; Fife Lake, Ypsilanti for 1877; Ionia for 1880, 1883-84; Adrian for 1880; Mallory Lake for first seven months of 1881, Hudson for last five months of 1881; Hastings for 1882; Hillsdale for 1882-84; Parkville for 1882; Port Austin for 1883-85, 1888-89; Winfield for 1883; Manistique, Mackinaw City, Swartz Creek for 1884-85; Pentwater for 1886; Kalamazoo for 1877-88; Alpena for 1879-87; Marquette for 1880-81, 1883-84, 1886-87; Grand Haven for 1880-84; Escanaba for 1881-85, 1887; Port Huron for 1881-85; Otsego for 1890; Tecumseh for 1877-85; Marshall for 1881-92; Thornville for 1877-92; Lansing for 1879-92; Ann Arbor for 1880-91; Albion for 1890-91; Harrisville for 1881-82, 1885-92; Traverse City for 1882-92; Birmingham for 1886-89; Battle Creek for 1877-80, 1882-84, 1892; Rockland for 1891-92.

† In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper.

EXHIBIT 31.—*Average Amount of Atmospheric Ozone (Night), by Year and Months, in 1892, compared with Annual and Monthly Averages for 1892, and for the 16 years, 1877-92. These Averages are for Groups of Several Stations in Michigan.**

| Years, etc. | Ozone by Night.—Degree of Coloration of Test-paper.† | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 16 years, 1877-92 | 3.52 | 3.93 | 4.21 | 4.16 | 3.87 | 3.76 | 3.51 | 2.89 | 2.97 | 2.89 | 3.22 | 3.33 | 3.77 |
| 1892, (7 stations) | 4.18 | 4.37 | 5.05 | 4.48 | 4.33 | 4.58 | 4.62 | 3.44 | 4.56 | 3.26 | 3.73 | 3.49 | 4.20 |
| 1893, (5 stations) | 4.20 | 4.03 | 4.92 | 4.92 | 4.62 | 4.55 | 4.15 | 3.66 | 4.56 | 3.24 | 3.91 | 3.28 | 4.53 |
| In 1893 Greater than Av. for 16 years, 1877-92 | .68 | .10 | .71 | .76 | .75 | .79 | .64 | .77 | .59 | .35 | .69 | ...... | .76 |
| In 1893 Less than Av. for 16 years, 1877-92 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | .05 | ...... |
| In 1893 Greater than in 1892 | .02 | ...... | ...... | .44 | .29 | ...... | ...... | .22 | 0 | ...... | .18 | ...... | .33 |
| In 1893 Less than in 1892 | ...... | .34 | .13 | ...... | ...... | .03 | .47 | ...... | 0 | .02 | ...... | .21 | ...... |

* The stations represented in Exhibit 31, are the same as those represented in Exhibit 30, relative to day ozone, and named in foot-note of that exhibit.

† In this exhibit allowance has been made for difference in sensitiveness of different lots of test-paper

### OBSERVATIONS FOR OZONE AT LANSING.

Since July 1, 1884, the observations for ozone at Lansing have been taken at the new shelter for meteorological instruments in the southwest part of the Capitol yard. Previous to July 1, 1884, the observations had been taken at the office window. Exhibit E, page 60, of the report for 1885, shows that the average for the month of July, 1884, is greater at each observation—7 A. M. to 2 P. M., 2 P. M. to 9 P. M., and 9 P. M. to 7 A. M. at the shelter for instruments than at the office window. Possibly this fact should be taken into consideration in studying ozone at Lansing through a long period of years.

EXHIBIT 32.—*Average Velocity of the Wind in Miles per hour, by Year and Months, in 1893, compared with Annual and Monthly Averages for 1892, and for the 11 years, 1882–92. From Registers of the Robinson's Self-registering Anemometer.* These Averages are for Groups of several Stations in Michigan.*

| Years, etc. | Average Miles per Hour. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 11 years, 1882-92 | 9.5 | 10.8 | 10.6 | 10.3 | 10.3 | 9.4 | 7.8 | 7.8 | 7.6 | 8.6 | 9.4 | 10.7 | 11.0 |
| 1892 (9 stations) | 9.2 | 10.8 | 8.8 | 9.2 | 11.8 | 9.7 | 7.5 | 6.9 | 7.3 | 8.4 | 9.4 | 10.4 | 9.8 |
| 1893 (8 stations) | 10.2 | 9.7 | 11.7 | 11.7 | 13.2 | 9.8 | 8.2 | 8.2 | 7.6 | 9.2 | 10.6 | 11.3 | 11.7 |
| In 1893 Greater than Av. for 11 years, 1882-92 | .7 | ...... | 1.1 | 1.4 | 2.9 | .4 | .4 | .4 | 0 | .6 | 1.2 | .6 | .7 |
| In 1893 Less than Av. for 11 years, 1882-92 | ...... | 1.1 | ...... | ...... | ...... | ...... | ...... | ...... | 0 | ...... | ...... | ...... | ...... |
| In 1893 Greater than in 1892 | 1.0 | ...... | 2.9 | 2.5 | 1.4 | .1 | .7 | 1.3 | .3 | .8 | 1.2 | .9 | 1.9 |
| In 1893 Less than in 1892 | ...... | 1.1 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |

* Gibbon's Anemometer was used at Ann Arbor.

EXHIBIT 33.—*Average Velocity of the Wind in Miles per hour, by Months for the Years 1880–92, and comparisons of 1893 with this Average and with the Year 1892. From Registers of the Robinson's Self-Registering Anemometer in the Office of the State Board of Health, State Capitol, Lansing, Michigan.*

| Years, etc. | Miles, by Self-Registering Anemometer. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 13 years, 1880-92 | 9.7 | 11.0 | 11.2 | 10.9 | 11.0 | 9.6 | 8.3 | 7.8 | 7.3 | 8.4 | 8.8 | 10.8 | 11.3 |
| 1892 | 8.5 | 11.5 | 6.3 | 9.3 | 13.6 | 10.3 | 7.2 | 5.5 | 5.6 | 7.4 | 7.9 | 8.5 | 9.2 |
| 1893 | 10.2 | 10.4 | 13.0 | 12.4 | 14.2 | 9.3 | 7.5 | 8.1 | 6.1 | 9.0 | 10.6 | 10.8 | 11.2 |
| In 1893 Greater than Av. for 13 years, 1880-92 | .5 | ...... | 1.8 | 1.5 | 3.2 | ...... | ...... | .3 | ...... | .6 | 1.8 | 0 | ...... |
| In 1893 Less than Av. for 13 years, 1880-92 | ...... | .6 | ...... | ...... | ...... | .3 | .8 | ...... | 1.2 | ...... | ...... | 0 | .1 |
| In 1893 Greater than in 1892 | 1.7 | ...... | 6.7 | 3.1 | .6 | ...... | .3 | 2.6 | .5 | 1.6 | 2.7 | 2.3 | 2.0 |
| In 1893 Less than in 1892 | ...... | 1.1 | ...... | ...... | ...... | 1.0 | ...... | ...... | ...... | ...... | ...... | ...... | ...... |

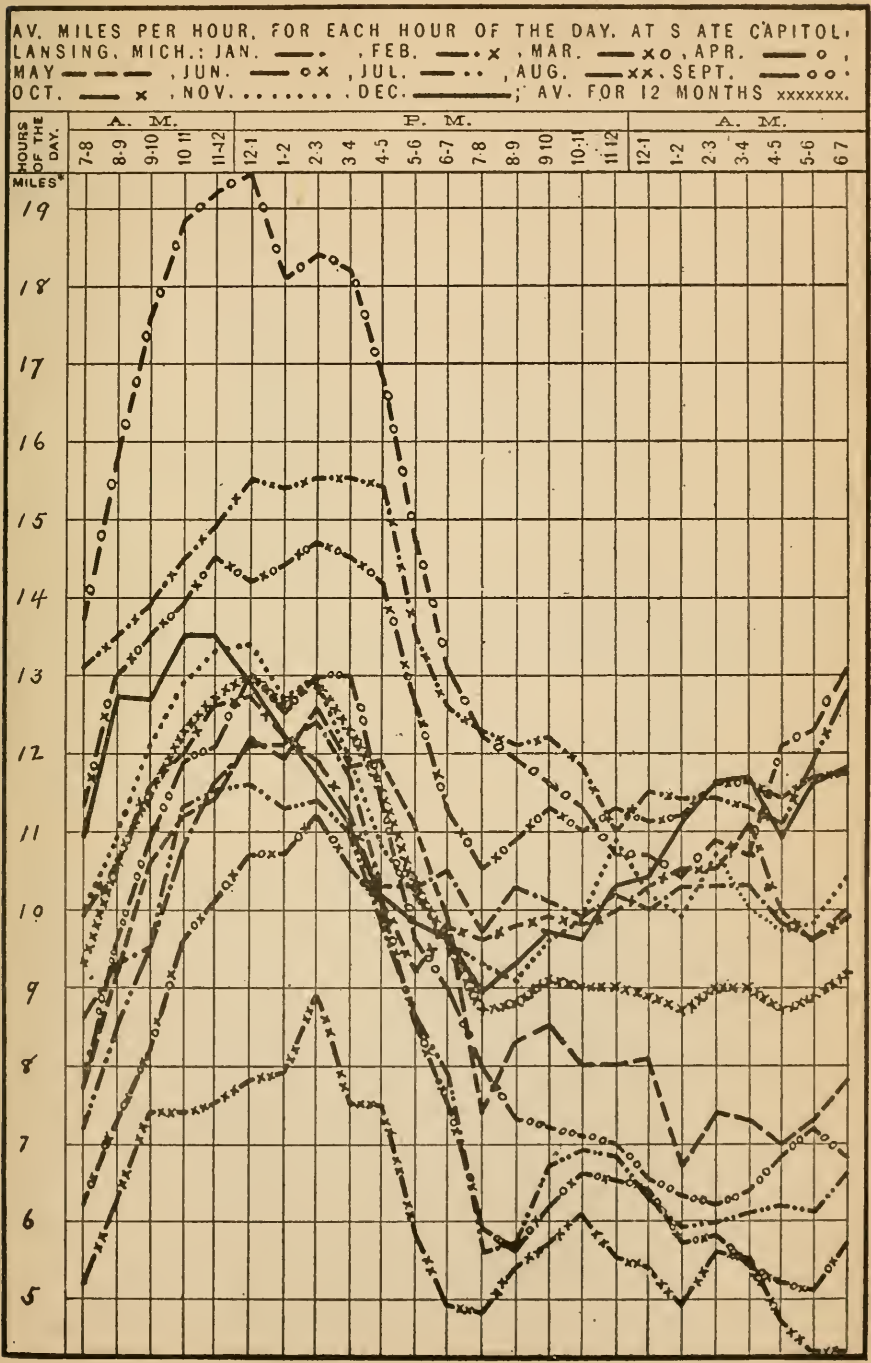
TABLE X.—*Average Velocity of the Wind in Miles per Hour, for each Hour of the Day, by Months of the Year 1893. Compiled from Registers of the Robinson's Self-Registering Anemometer, exposed above the roof of the Capitol, and registering in the office of the State Board of Health, Lansing, Michigan.*

| Months. | Averages. | | | Hours (1893) and Average Miles per Hour. | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | A. M. | | | | | P. M. | | | | | | | | | | | | A. M. | | | | | | |
| | Av. 14 years, 1880–93. | 1892. | 1893. | 7–8 | 8–9 | 9–10 | 10–11 | 11–12 | 12–1 | 1–2 | 2–3 | 3–4 | 4–5 | 5–6 | 6–7 | 7–8 | 8–9 | 9–10 | 10–11 | 11–12 | 12–1 | 1–2 | 2–3 | 3–4 | 4–5 | 5–6 | 6–7 |
| Year | 9.7 | 8.5 | 10.2 | 9.3 | 10.6 | 11 5 | 12.3 | 12.7 | 13.0 | 12.6 | 12.9 | 12.3 | 11.5 | 10.3 | 9.6 | 8.7 | 8.8 | 9.1 | 9.0 | 9.0 | 8.9 | 8.7 | 9.0 | 9.0 | 8.7 | 8.9 | 9.2 |
| January | 11.0 | 11.3 | *10.4 | 8.6 | 9.3 | 9.5 | 10.8 | 11.6 | 12.1 | 12 1 | 12.4 | 11.7 | 10.3 | 10.3 | 10.5 | 9.7 | 10.3 | 10.1 | 9.9 | 10.2 | 10.0 | 10 3 | 10.3 | 10.3 | 9.8 | 9.6 | 10.0 |
| February | 11.4 | 6.3 | 13.0 | 13.1 | 13.5 | 13 9 | 14.5 | 14.9 | 15.5 | 15.4 | 15.5 | 15.5 | 14.4 | 13.5 | 12.6 | 12.3 | 12.1 | 12.2 | 11.8 | 11.0 | 11.5 | 11.4 | 11.4 | 11.3 | 11.1 | 11.9 | 12.8 |
| March | 11.0 | 9.3 | 12.4 | 11.3 | 13.0 | 13.5 | 13.9 | 14.5 | 14.2 | 14.4 | 14.7 | 14.5 | 14.2 | 12 6 | 11.3 | 10.5 | 10.9 | 11.3 | 11.0 | 11.3 | 11.1 | 11.2 | 11.7 | 11.7 | 11.4 | 11.7 | 11.7 |
| April | 11.2 | 13.5 | 14.2 | 13.7 | 15.8 | 17.6 | 18.8 | 19.2 | 19.4 | 18.1 | 18.4 | 18.2 | 16.8 | 14.7 | 13.1 | 12.2 | 11.9 | 11.6 | 11.3 | 10.7 | 10.7 | 10.4 | 10.9 | 10.7 | 12.1 | 12.3 | 13.1 |
| May | 9.6 | 10.3 | 9.3 | 7.7 | 9.2 | 10.6 | 11.2 | 11.4 | 12.2 | 11.9 | 12.6 | 11.8 | 11.9 | 11.1 | 9.9 | 7.4 | 8.3 | 8.5 | 8.0 | 8.0 | 8.1 | 6.7 | 7.4 | 7.3 | 7.0 | 7.3 | 7.8 |
| June | 8.2 | 7.2 | 7.5 | 6.2 | 7.3 | 8.2 | 9.6 | 10.1 | 10.7 | 10.7 | 11.2 | 10.5 | 10.1 | 8.5 | 7 5 | 5.9 | 5.6 | 6.2 | 6.6 | 6.5 | 6.4 | 5.7 | 5.8 | 5.4 | 5.2 | 5.1 | 5.7 |
| July | 7.8 | 5.5 | †8.1 | 7.2 | 8.5 | 9.5 | 11.3 | 11.5 | 11.6 | 11.3 | 11.4 | 11.0 | 9.8 | 8 7 | 7.9 | 5.6 | 5.7 | 6.7 | 6.9 | 6.8 | 6.3 | 5.9 | 6.0 | 6.1 | 6.2 | 6.1 | 6.6 |
| August | 7.2 | 5.6 | †6.1 | 5.2 | 6.3 | 7.4 | 7 4 | 7.5 | 7.8 | 7.9 | 8.9 | 7.5 | 7.5 | 5.8 | 4.9 | 4.8 | 5.4 | 5.7 | 6 1 | 5.5 | 5.4 | 4.9 | 5.6 | 5.5 | 4.7 | 4.3 | 4.3 |
| September | 8.5 | 7.4 | 9.0 | 7.7 | 9.6 | 10.9 | 11.9 | 12.1 | 13.0 | 12.5 | 13.0 | 13.0 | 11.4 | 9.6 | 9 0 | 8.0 | 7.3 | 7.2 | 7.1 | 7.0 | 6.5 | 6.3 | 6.2 | 6.4 | 6.8 | 7.2 | 6.8 |
| October | 8.9 | 8.0 | *10.6 | 9.9 | 10.6 | 11.6 | 12.0 | 12.6 | 12.7 | 12.2 | 11.9 | 11.2 | 10.1 | 9.2 | 9.8 | 9.6 | 9.8 | 9.9 | 9.8 | 10.0 | 10.3 | 10.5 | 10.5 | 11.1 | 10.0 | 9.6 | 9.9 |
| November | 10.8 | 8.5 | ¶10.8 | 10 0 | 10 9 | 12.1 | 12.9 | 13.3 | 13.4 | 12.7 | 13.0 | 11.9 | 10.8 | 10.2 | 9.6 | 9.3 | 9.1 | 9.6 | 9.9 | 10.9 | 10.2 | 9.9 | 10.7 | 10.0 | 9.7 | 9.8 | 10.4 |
| December | 11 3 | 9.2 | §11.2 | 10.9 | 12.7 | 12.7 | 13.5 | 13.5 | 12.9 | 12.2 | 11.7 | 11.1 | 10.2 | 9.8 | 9.6 | 8 9 | 9.3 | 9 7 | 9.6 | 10.3 | 10.4 | 11.1 | 11.6 | 11.7 | 10.9 | 11 6 | 11.8 |

* For only about 29 days. † For only about 30 days. ¶ For only about 28 days. § For only about 30 days.

The statements in the third figure column in Table X. of the average velocity of the wind in miles per hour, by months, during the year 1893, are graphically represented in Diagram XI., page 59. The remaining columns of Table X. for 1893, are graphically represented in Diagram X., page 57.

DIAGRAM X.—VELOCITY OF WIND, BY HOURS AND MONTHS, 1893.



[Plate 752]

8

TABLE XI.—*Average Velocity of the Wind in Miles per Hour for the Year and for each Month of the Year 1893, at 8 Stations in Michigan. Computed from Registers of the Robinson's Self-Registering Anemometer,* by Observers for the State Board of Health, and for the U. S. Weather Bureau.*

| Stations in Michigan.† | Divisions of the State. | Miles, by Self-Registering Anemometer. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year. | | Months, 1893. | | | | | | | | | | | |
| | | Norm. ‡ | 1893. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sept | Oct. | Nov. | Dec. |
| Av. for 8 Stations | ------- | ----- | 10.2 | 9.7 | 11.7 | 11.7 | 13.2 | 9.8 | 8.2 | 8.2 | 7.6 | 9.2 | 10.6 | 11.3 | 11.7 |
| Marquette | U. P. | $9.3^{8}$ | 10.6 | 10.8 | 11.0 | 11.1 | 10.2 | 9.8 | 9.0 | 9.0 | 10.0 | 10.5 | 12.7 | 11.5 | 11.7 |
| Sault Ste. Marie | U. P. | $8.6^{2}$ | 9.0 | 7.9 | 10.0 | 11.0 | 12.1 | 8.7 | 7.3 | 7.1 | 6.4 | 9.2 | 9.2 | 10.0 | 8.5 |
| Alpena | N.E. | $9.8^{3}$ | 10.2 | 9.7 | 10.8 | 12.1 | 13.3 | 9.6 | 8.2 | 8 9 | 7.7 | 9.8 | 11.0 | 10.6 | 10.9 |
| Grand Haven | W. | $10.7^{4}$ | 10.8 | 10.1 | 12.1 | 11.4 | 13.8 | 10.3 | 8.5 | 8.1 | 7.2 | 9.7 | 11.3 | 12.8 | 14.1 |
| Port Huron | B. & E. | $10.4^{12}$ | 11.2 | 10.0 | 12.7 | 12.3 | 13.8 | 11.4 | 9.2 | 9.0 | 9.8 | 7.8 | 11.1 | 12.9 | 14.3 |
| Lansing, S. B. of H. | C. | $9.7^{14}$ | 10.2 | 10.4 | 13.0 | 12.4 | 14.3 | 9.3 | 7.5 | 8.1 | 6.1 | 9.0 | 10.8 | 10.9 | 11.1 |
| Ann Arbor | S. C. | $8.7^{12}$ | 8.3 | 7.5 | 10.9 | 10.5 | 12.6 | 8.3 | 6.1 | 5.9 | 5.2 | 6.8 | 7.5 | 9.0 | 9.3 |
| Detroit | S. E. | $9.8^{12}$ | 11.6 | 11.3 | 13.3 | 12.6 | 15.3 | 10.9 | 9.5 | 9.6 | 8.4 | 10.4 | 11.3 | 12.6 | 14.0 |

* Gibbon's Anemometer was used at Ann Arbor.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

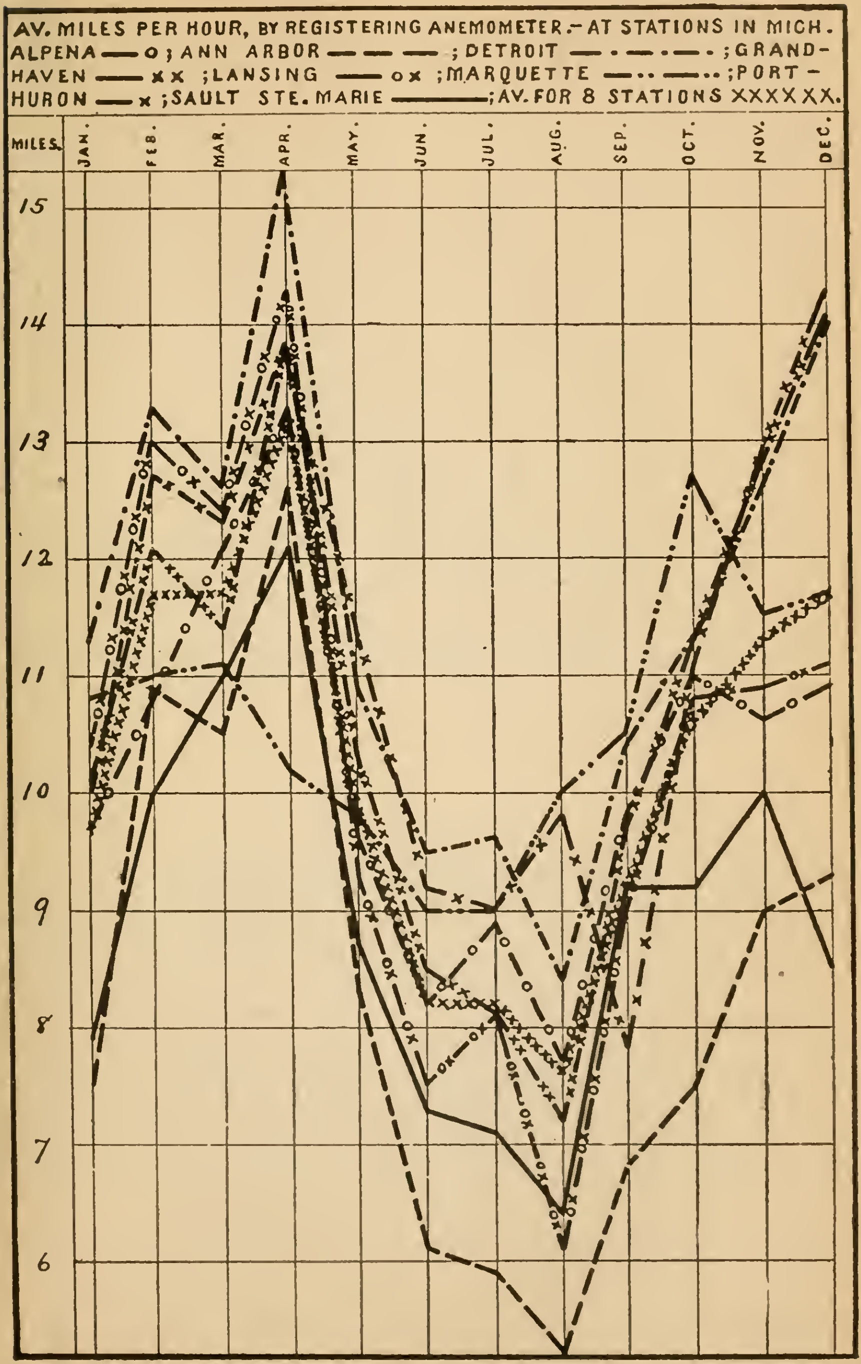
‡ Numbers in this column state the average velocity of the wind in miles per hour for periods of years ending in each case with Dec. 31, 1893. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

Graphic representations of statements made in Table XI. are given in Diagram XI., page 59.

The construction and purport of the diagrams relating to direction of wind may be explained as follows:—

In Diagrams XII., XIII., XIV. and XV., pages 64, 60, 61 and 62, relating to the direction of the wind, the single figures or separate groups in lines are designed to indicate by the length of the lines the number and the proportion of regular observations at 7 A. M., 2 P. M. and 9 P. M. daily, at which the wind was blowing from each of the eight principal points of compass at the places and for the periods of time stated in the margin; and by the direction of the lines on the page, the direction of the wind. Each figure consists of lines drawn to a common center from some or all of the following directions on the page and indicating that at the times of observation the wind blew from points of the compass as follows: Lines toward the common center from the top of the page indicate observations that the wind was blowing from the north; from the right-hand side, observations that the wind was from the east; from the bottom of the page, that it was from the south; from the left-hand side, that it was from the west; from the upper left-hand corner, that it was from the northwest; from the upper right-hand corner, that it was from the northeast; from the lower right-hand corner, that it was from the southeast; and from the lower left-hand corner that it was from the southwest. The number of regular observations at which the wind was blowing from the direction denoted by a line as indicated by the length of that line, .01 of an inch being the unit or the length of line for one observation. The circles indicate calms, the number of regular observations at which there was no wind being denoted by the length of the *radius* of the circle drawn about the point of convergence of the lines for a given place or period of time, the length of one observation being, as before, .01 of an inch. Thus, by Diagram XII., page 64, or by Table XIV., pages 65-68, it appears that at Ann Arbor in February, 1893, at one of the regular tri-daily observations for the month there was a calm; at 21 observations the wind was blowing from the west; at 13 observations, from the northwest; at 1 from the northeast, etc. For convenient study the top of these diagrams should be held toward the north. Definite numerical statements corresponding to these diagrams are given in Tables XII., XIII., and XIV. and Exhibit 34, pages 61, 62, 65-68, 60.

DIAGRAM XI.—VELOCITY OF WIND, BY MONTHS IN 1893.



[Plate 753.]

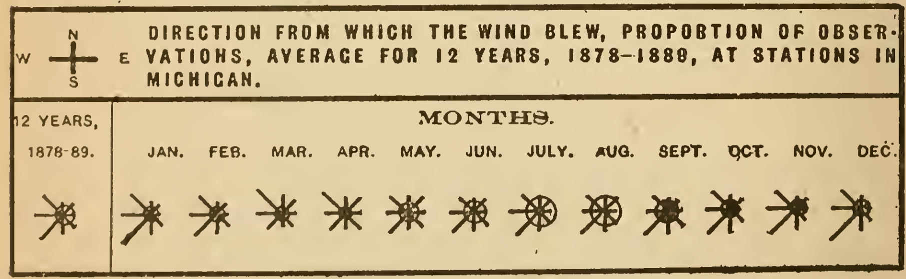
EXHIBIT 34.—DIRECTION OF WIND, 1878-89.—*Number of Observations per Month (made tri-daily), at which the wind was blowing from the several (eight) points of Compass.—Annual and Monthly Averages for the 12 Years, 1878-89, at Stations in Michigan.**

| Points of Compass. | Average Number of Observations per Month—12 Years, 1878-89. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| All observations.... | 91 | 93 | 85 | 93 | 90 | 93 | 90 | 93 | 93 | 89 | 92 | 90 | 93 |
| Calm | 5 | 4 | 4 | 4 | 4 | 5 | 6 | 8 | 8 | 6 | 5 | 4 | 4 |
| North | 7 | 6 | 6 | 10 | 9 | 8 | 7 | 8 | 8 | 6 | 8 | 6 | 6 |
| Northeast | 8 | 6 | 7 | 10 | 11 | 11 | 9 | 8 | 10 | 7 | 8 | 7 | 5 |
| East | 6 | 5 | 6 | 7 | 8 | 8 | 6 | 5 | 6 | 6 | 5 | 5 | 5 |
| Southeast | 9 | 9 | 9 | 9 | 11 | 11 | 10 | 8 | 9 | 11 | 9 | 7 | 8 |
| South | 10 | 11 | 10 | 7 | 8 | 10 | 11 | 10 | 10 | 12 | 12 | 11 | 11 |
| Southwest | 17 | 22 | 16 | 12 | 12 | 15 | 16 | 18 | 17 | 18 | 18 | 19 | 23 |
| West | 14 | 16 | 14 | 14 | 11 | 12 | 13 | 16 | 12 | 12 | 13 | 17 | 17 |
| Northwest | 14 | 15 | 13 | 19 | 16 | 13 | 11 | 13 | 13 | 12 | 14 | 15 | 14 |

* At 12 stations in 1878; 16 in 1879; 19 in 1880; 19 in 1881; 21 in 1882; 19 in 1883; 21 in 1884; 21 in 1885; 16 in 1886; 17 in 1887; 13 in 1888; and 11 in 1889.

Graphic representations of statements made in Exhibit 34 are given in Diagram XIII., this page.

DIAGRAM XIII.—WIND, DIRECTION, IN MICH., AVERAGE 12 YEARS, 1878-1889.



* SCALE, RADIUS .01 OF ONE INCH TO ONE OBSERVATION

[Plate 675.]

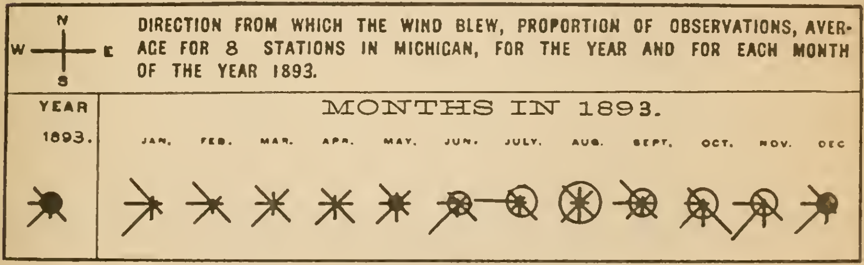
TABLE XII.—*Number of Observations per Month (at 7 A. M., 2 P. M. and 9 P. M., daily), at which the wind was blowing from each of the Eight Principal Points of Compass, during the Year and during each Month of the Year 1893. Average for 8 Stations in Michigan.**

| Points of Compass. | Average Number of Observations per Month, 1893. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| All observations (8 stations) | 90 | 92 | 85 | 92 | 90 | 91 | 89 | 85 | 91 | 89 | 94 | 90 | 91 |
| Calm | 5 | 1 | 2 | 3 | 2 | 4 | 6 | 8 | 11 | 7 | 8 | 7 | 6 |
| North | 5 | 5 | 3 | 7 | 5 | 7 | 3 | 5 | 10 | 4 | 3 | 2 | 4 |
| Northeast | 6 | 3 | 6 | 11 | 11 | 10 | 6 | 4 | 9 | 8 | 2 | 1 | 4 |
| East | 5 | 5 | 5 | 6 | 9 | 7 | 9 | 3 | 5 | 6 | 3 | 1 | 4 |
| Southeast | 13 | 8 | 14 | 14 | 15 | 9 | 14 | 13 | 11 | 12 | 23 | 13 | 7 |
| South | 9 | 10 | 6 | 7 | 9 | 11 | 8 | 7 | 10 | 6 | 13 | 13 | 12 |
| Southwest | 19 | 25 | 16 | 18 | 17 | 16 | 23 | 7 | 15 | 12 | 19 | 27 | 25 |
| West | 14 | 16 | 16 | 11 | 10 | 11 | 12 | 26 | 6 | 16 | 11 | 18 | 15 |
| Northwest | 14 | 19 | 17 | 15 | 12 | 16 | 8 | 12 | 14 | 18 | 12 | 8 | 14 |

*The names of observers, their places of observation, and the counties and divisions of the State in which those places are situated are stated in Exhibit 1, page 2.

Graphic representations of statements in Table XII. are given in Diagram XIV., this page.

DIAGRAM XIV.—WIND, DIRECTION, IN MICH., YEAR AND MONTHS, 1893.



[Plate 755.]

TABLE XIII.—*Average Number of Observations per Month for the year 1893, at which the wind was blowing from each of the Eight Principal Points of the Compass, at each of 8 Stations* in Michigan; also the Average line for the 8 Stations.*

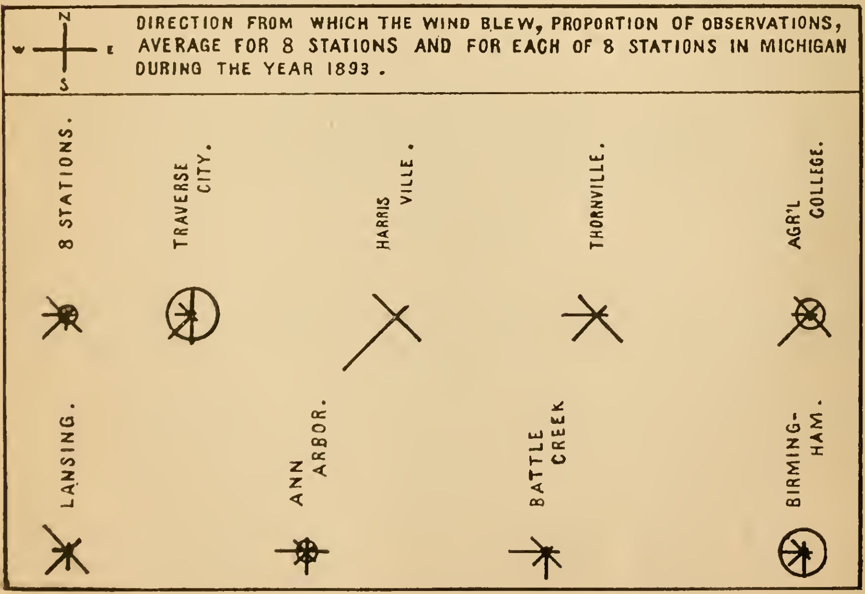
| Stations in Michigan.* | Divisions of the State.† | Average Number of Observations per Month, 1893. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | All Obs. | Calms. | N. | N. E. | E. | S. E. | S. | S. W. | W. | N. W. |
| Av. for 8 stations | | 90 | 5 | 5 | 6 | 5 | 13 | 9 | 20 | 13 | 14 |
| Traverse City | N. W. | 91 | 14 | 13 | 3 | 2 | 4 | 16 | 19 | 9 | 11 |
| Harrisville | N. E. | 91 | 0 | 0 | 9 | 0 | 19 | 0 | 42 | 2 | 18 |
| Thornville | B. & E. | 91 | 0 | 1 | 8 | 7 | 20 | 2 | 20 | 19 | 15 |
| Agr'l College | C. | 91 | 8 | 1 | 8 | 4 | 16 | 3 | 25 | 11 | 14 |
| Lansing, S. B. of H. | C. | 91 | 0 | 4 | 8 | 3 | 17 | 10 | 19 | 10 | 20 |
| Ann Arbor | S. C. | 91 | 6 | 8 | 4 | 12 | 8 | 14 | 12 | 18 | 10 |
| Battle Creek | S. C. | 91 | 2 | 4 | 5 | 8 | 13 | 16 | 12 | 22 | 11 |
| Birmingham | S. E. | 80 | 13 | 7 | 4 | 5 | 5 | 14 | 11 | 12 | 10 |

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

† The full names of the divisions and counties in each division, are stated in Exhibit I, in a paper which follows on weekly reports of sickness.

Graphic representations of statements in Table XIII. are given in Diagram XV., this page.

DIAGRAM XV.— WIND, DIRECTION, AT STATIONS IN MICHIGAN, 1893.


N
W
E
S
DIRECTION FROM WHICH THE WIND BLEW, PROPORTION OF OBSERVATIONS, AVERAGE FOR 8 STATIONS AND FOR EACH OF 8 STATIONS IN MICHIGAN DURING THE YEAR 1893.
8 STATIONS.
TRAVERSE CITY.
HARRISVILLE.
THORNVILLE.
AGR'L COLLEGE.
LANSING.
ANN ARBOR.
BATTLE CREEK
BIRMINGHAM.

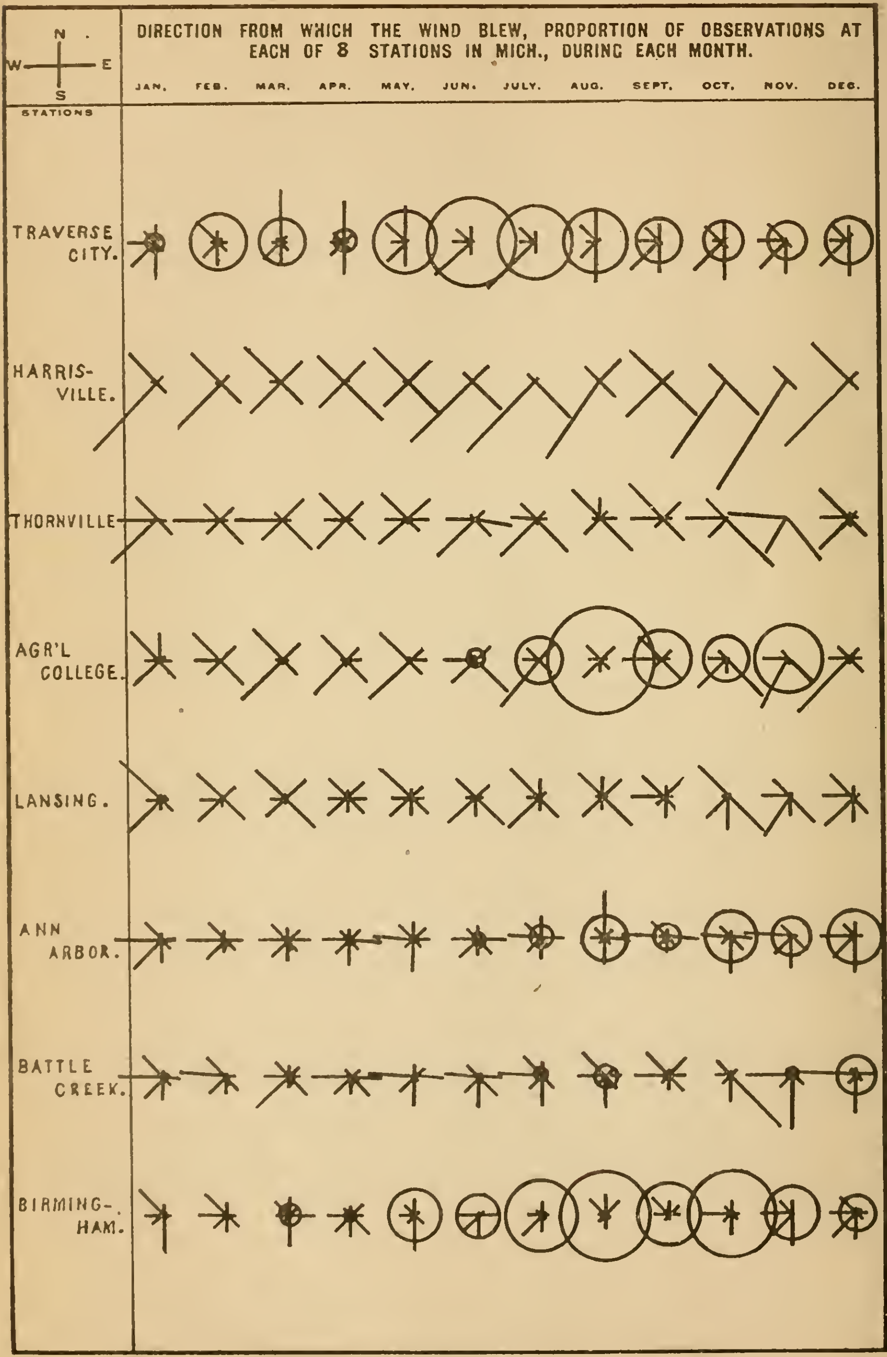
[Plate 756.]

## DIAGRAMS RELATING TO METEOROLOGICAL CONDITIONS.

Most of the diagrams in this paper are to be read by tracing each irregular line across the diagram from left to right, and noting at what point it intersects each of the perpendicular lines having the name of the month at the top. What station is represented by the irregular line may be learned from the head of the diagram. The degree of value denoted by the intersection may be learned by referring to the figures in the left-hand column. Thus, in Diagram I., page 20, relating to average temperature in 1893, tracing the line "——×" representing Thornville, it may be seen that the average temperature at Thornville was, in January, 16.09°, in March about 32°, in August about 70°, in October about 53°, etc. Definite numerical statements of the average temperature for each month at each station may be found in table I., page 21, and accompanying each diagram is a table giving exact numerical statements for the conditions represented. The average lines given in each table are represented in the corresponding diagram by an × line, thus ××××. The lines in the diagrams give more ready general comparisons of stations with each other, or of months, with each other, than is possible from the mere numerical statements. By Diagram II., page 27, it appears at a glance that the average daily range of temperature at Lansing in 1893 was, during August, higher than at any other of the seven stations represented in that diagram, and during January was lower at Marquette. The marked agreement in the course of the lines in Diagram I., page 20, representing mean monthly temperature at seven stations, and also that the agreement is closer in September, October, November and December than in the other months, appear at once on reference to the diagram. The resemblance between the lines in Diagram I., page 20, relating to mean temperature by months in 1893, and those in Diagram III., page 33, relating to absolute humidity of the atmosphere for the same periods, is apparent. By Diagram X., page 57, it appears that in every month of the year the highest velocity of the wind (on an average for the month) is reached between 12 m. and 2 p. m., and that the lowest velocity occurs in the latter part of the night or in early morning, and that in 1893 at Lansing, the months of most wind were February and April. By reference to Diagram XI., page 59, it may be seen that at other stations in Michigan where records of actual miles of wind traveled were kept, April was in 1893, the month of greatest wind. These statements illustrate the reading of the diagrams for any use it may be desired to make of the tables and diagrams. The four diagrams relating to the direction of the wind are constructed on a different principle and the manner of reading them is explained on preceding pages in this article.

Diagrams XII,, XIII., XIV. and XV., relating to the direction of the wind, are constructed on a plan different from that of the other diagrams. A description of the plan of their construction, method of reading, etc., is printed on page 58.

DIAGRAM XII —WIND, DIRECTION, AT STATIONS, BY MONTHS, 1893.



[Plate 751.]

TABLE XIV.—*Number of Observations for Months and Year 1893, at which the wind was blowing from each of the Eight Principal Points of the Compass, at 13 Stations* in Michigan; also Average Line for 8 of the said Stations from which nearly Complete Observations were received for the Year. (Observations were made at 7 A. M., 2 P. M. and 9 P. M,, Daily.)*

| Stations in Michigan.* | Divisions of the State.* | January. | | | | | | | | | | February. | | | | | | | | | | March. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S.W. | W. | N.W | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S.W | W. | N.W | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S.W. | W. | N.W |
| Av. 8 stations†.. | ........ | 92 | 1 | 5 | 3 | 5 | 8 | 10 | 25 | 16 | 19 | 83 | 2 | 3 | 6 | 5 | 14 | 6 | 16 | 16 | 17 | 92 | 3 | 7 | 11 | 6 | 14 | 7 | 18 | 11 | 15 |
| Rockland........ | U. P. | 76 | 7 | 13 | 0 | 16 | 3 | 7 | 2 | 15 | 13 | 80 | 4 | 8 | 0 | 18 | 2 | 10 | 0 | 34 | 4 | 93 | 7 | 18 | 4 | 26 | 1 | 14 | 2 | 14 | 7 |
| Traverse City.... | N. W. | 93 | 5 | 10 | 6 | 0 | 7 | 21 | 19 | 16 | 9 | 84 | 15 | 7 | 3 | 5 | 7 | 13 | 12 | 5 | 17 | 93 | 13 | 29 | 6 | 5 | 7 | 12 | 13 | 5 | 3 |
| Harrisville ...... | N. E. | 93 | 0 | 0 | 5 | 1 | 8 | 2 | 51 | 4 | 22 | 84 | 0 | 0 | 7 | 0 | 17 | 0 | 36 | 2 | 22 | 93 | 0 | 1 | 17 | 0 | 17 | 0 | 24 | 6 | 28 |
| Ashton .......... | N. C. | 93 | 2 | 9 | 0 | 0 | 23 | 7 | 14 | 11 | 27 | 84 | 1 | 4 | 2 | 7 | 25 | 6 | 5 | 15 | 19 | 93 | 2 | 12 | 0 | 4 | 17 | 9 | 6 | 26 | 17 |
| Thornville....... | B. & E. | 93 | 0 | 0 | 1 | 4 | 12 | 0 | 35 | 23 | 18 | 84 | 0 | 0 | 10 | 5 | 19 | 1 | 10 | 26 | 13 | 93 | 0 | 0 | 16 | 5 | 23 | 0 | 16 | 27 | 6 |
| Agr'l College.... | C. | 93 | 2 | 14 | 4 | 7 | 13 | 1 | 21 | 9 | 22 | 84 | 1 | 1 | 11 | 2 | 19 | 2 | 12 | 16 | 20 | 98 | 0 | 1 | 13 | 3 | 12 | 3 | 32 | 5 | 24 |
| Lansing, S. B. of H. .......... | C. | 93 | 0 | 3 | 8 | 5 | 10 | 6 | 26 | 9 | 31 | 84 | 0 | 0 | 10 | 1 | 17 | 5 | 18 | 13 | 20 | 93 | 0 | 2 | 15 | 2 | 24 | 4 | 15 | 9 | 22 |
| Albion .......... | S. C. | 93 | 20 | 0 | 5 | 0 | 2 | 0 | 40 | 8 | 28 | 84 | 9 | 0 | 3 | 3 | 12 | 4 | 21 | 11 | 21 | 93 | 14 | 2 | 14 | 0 | 15 | 5 | 21 | 12 | 10 |
| Ann Arbor........ | S. C. | 93 | 0 | 4 | 0 | 8 | 6 | 13 | 23 | 26 | 13 | 84 | 1 | 5 | 1 | 11 | 9 | 8 | 15 | 21 | 13 | 93 | 8 | 7 | 9 | 13 | 9 | 12 | 12 | 16 | 12 |
| Battle Creek..... | S. C. | 93 | 0 | 4 | 3 | 9 | 6 | 13 | 16 | 25 | 17 | 84 | 0 | 2 | 2 | 6 | 11 | 10 | 13 | 26 | 14 | 93 | 0 | 6 | 8 | 6 | 15 | 7 | 26 | 14 | 11 |
| Marshall......... | S. C. | 93 | 0 | 2 | 2 | 6 | 11 | 13 | 19 | 29 | 11 | 84 | 0 | 2 | 4 | 12 | 6 | 9 | 12 | 20 | 19 | 93 | 0 | 3 | 15 | 8 | 11 | 10 | 7 | 29 | 10 |
| Tecumseh ....... | S. C. | ...... | ..... | .... | .... | .... | .... | .. | .... | .... | .... | ...... | ...... | .... | .... | .... | .... | .. | .... | .... | .... | ...... | ...... | .... | .... | .... | .... | .. | .... | .... | .... |
| Birmingham .... | S. E. | 85 | 3 | 7 | 2 | 4 | 3 | 24 | 10 | 12 | 20 | 79 | 2 | 7 | 1 | 6 | 10 | 10 | 11 | 16 | 16 | 82 | 6 | 10 | 6 | 14 | 2 | 18 | 6 | 9 | 11 |

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* For names of observers, etc., see Exhibit 1, page 2. For names of divisions, etc., see Exhibit I., in a paper which follows on weekly reports of sickness.

† This line includes only the 8 stations, at which observations were made tri-daily, and from which statements complete, or nearly complete, were received for every month of the year; it does not include Aston, Albion, Rockland, Marshall and Tecumseh.

NOTE.—Graphic representations of statements for 8 lines in this table are given in Diagram XII., page 64, which is explained on page 58.

TABLE XIV.—Continued.—*Direction of Wind, Months in 1893.—Observations at which the Wind was blowing from Direction named.*

| Stations in Michigan.* | Divisions of the State.* | April. | | | | | | | | | | May. | | | | | | | | | | June. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S.W. | W. | N.W | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S W. | W. | N.W | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S W. | W. | N.W |
| Av. 8 stations† | ........ | 89 | 2 | 5 | 11 | 9 | 15 | 9 | 17 | 10 | 12 | 91 | 4 | 7 | 10 | 7 | 9 | 11 | 16 | 11 | 16 | 87 | 6 | 3 | 6 | 9 | 14 | 8 | 23 | 12 | 8 |
| Rockland | U. P. | 78 | 7 | 15 | 1 | 36 | 3 | 6 | 0 | 6 | 4 | ------ | ------ | ---- | ---- | ---- | ---- | -- | ---- | ---- | ---- | 89 | 5 | 20 | 0 | 27 | 1 | 22 | 2 | 12 | 0 |
| Traverse City | N. W. | 90 | 6 | 22 | 8 | 4 | 7 | 18 | 10 | 7 | 8 | 92 | 17 | 20 | 2 | 0 | 1 | 14 | 15 | 8 | 15 | 90 | 24 | 9 | 0 | 1 | 0 | 9 | 27 | 10 | 10 |
| Harrisville | N. E. | 90 | 0 | 0 | 16 | 3 | 30 | 1 | 19 | 0 | 21 | 93 | 0 | 2 | 19 | 0 | 23 | 1 | 19 | 8 | 26 | 90 | 0 | 1 | 12 | 0 | 23 | 0 | 47 | 0 | 7 |
| Ashton | N. C. | 90 | 0 | 4 | 0 | 9 | 29 | 2 | 7 | 18 | 21 | 93 | 0 | 26 | 0 | 2 | 13 | 1 | 18 | 18 | 15 | 90 | 0 | 6 | 3 | 9 | 6 | 0 | 30 | 25 | 11 |
| Thornville | B. & E. | 90 | 0 | 0 | 14 | 5 | 16 | 1 | 22 | 12 | 20 | 93 | 0 | 1 | 17 | 12 | 8 | 8 | 21 | 13 | 21 | 90 | 0 | 0 | 8 | 22 | 13 | 2 | 28 | 14 | 8 |
| Agr'l College | C. | 90 | 1 | 1 | 10 | 9 | 17 | 3 | 27 | 3 | 19 | 93 | 1 | 2 | 11 | 10 | 11 | 0 | 36 | 0 | 22 | 90 | 5 | 2 | 11 | 3 | 26 | 1 | 19 | 18 | 5 |
| Lansing, S. B. of H. | C. | 90 | 0 | 3 | 13 | 11 | 14 | 9 | 15 | 11 | 14 | 93 | 0 | 4 | 9 | 7 | 13 | 10 | 15 | 11 | 24 | 90 | 0 | 1 | 10 | 4 | 22 | 11 | 21 | 6 | 15 |
| Albion | S. C. | 90 | 20 | 1 | 13 | 1 | 10 | 6 | 23 | 9 | 7 | 93 | 29 | 2 | 9 | 3 | 4 | 1 | 21 | 7 | 17 | 90 | 35 | 2 | 5 | 1 | 8 | 2 | 26 | 4 | 7 |
| Ann Arbor | S. C. | 90 | 2 | 6 | 8 | 18 | 8 | 15 | 12 | 14 | 7 | 93 | 1 | 8 | 10 | 10 | 7 | 19 | 6 | 21 | 11 | 90 | 4 | 7 | 5 | 17 | 11 | 10 | 14 | 14 | 8 |
| Battle Creek | S. C. | 90 | 0 | 2 | 6 | 17 | 15 | 10 | 14 | 22 | 4 | 93 | 1 | 7 | 9 | 17 | 4 | 17 | 11 | 25 | 2 | 90 | 0 | 2 | 2 | 13 | 14 | 17 | 12 | 20 | 10 |
| Marshall | S. C. | 90 | 0 | 0 | 12 | 11 | 6 | 16 | 23 | 15 | 7 | 93 | 0 | 10 | 10 | 9 | 12 | 8 | 11 | 22 | 11 | 90 | 0 | 1 | 7 | 13 | 7 | 10 | 22 | 15 | 15 |
| Tecumseh | S. C. | ------ | ----- | ---- | ---- | ---- | ---- | -- | ---- | ---- | ---- | 93 | 0 | 14 | 12 | 15 | 4 | 11 | 24 | 6 | 7 | 88 | 16 | 7 | 6 | 13 | 4 | 14 | 12 | 2 | 14 |
| Birmingham | S. E. | 84 | 4 | 6 | 9 | 6 | 15 | 12 | 13 | 13 | 6 | 81 | 15 | 9 | 3 | 2 | 7 | 21 | 7 | 9 | 8 | 65 | 11 | 2 | 3 | 9 | 1 | 13 | 12 | 12 | 2 |

*† For these references see foot-notes to this table on page 2.

NOTE.—Graphic representations of statements for 8 lines in this table are given in Diagram XII., page 64, which is explained on page 58.

TABLE XIV.—CONTINUED.—*Direction of Wind, Months in 1893.—Observations at which the Wind was blowing from Directions named*

| Stations in Michigan.* | Divisions of the State.* | July. | | | | | | | | | | August. | | | | | | | | | | September. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total. | Calm. | N. | N.E. | E. | S.E | S. | S.W. | W. | N.W | Total. | Calm. | N. | N.E | E. | S.E. | S. | S.W. | W. | N.W | Total. | Calm. | N. | N.E. | E. | S.E | S. | S.W. | W. | N.W |
| Av. 8 stations† | ------- | 91 | 8 | 5 | 4 | 3 | 13 | 7 | 7 | 26 | 12 | 91 | 11 | 10 | 9 | 5 | 11 | 10 | 15 | 6 | 14 | 88 | 7 | 4 | 8 | 6 | 12 | 6 | 12 | 16 | 18 |
| Rockland | U. P. | 89 | 11 | 18 | 0 | 20 | 0 | 12 | 0 | 24 | 4 | 74 | 7 | 13 | 0 | 15 | 0 | 26 | 2 | 10 | 1 | 80 | 4 | 10 | 0 | 30 | 2 | 17 | 0 | 17 | 0 |
| Traverse City | N. W. | 93 | 20 | 6 | 1 | 0 | 3 | 7 | 35 | 9 | 12 | 93 | 17 | 18 | 3 | 2 | 0 | 23 | 12 | 6 | 12 | 90 | 12 | 10 | 1 | 1 | 3 | 17 | 23 | 12 | 11 |
| Harrisville | N. E. | 93 | 0 | 0 | 4 | 0 | 28 | 0 | 54 | 1 | 6 | 93 | 0 | 0 | 17 | 1 | 12 | 0 | 51 | 1 | 11 | 90 | 0 | 0 | 8 | 0 | 27 | 0 | 29 | 1 | 25 |
| Ashton | N. C. | 92 | 0 | 16 | 0 | 0 | 7 | 4 | 14 | 26 | 25 | 93 | 0 | 23 | 0 | 1 | 8 | 3 | 24 | 21 | 13 | 87 | 0 | 4 | 4 | 9 | 20 | 3 | 11 | 16 | 20 |
| Thornville | B. & E. | 93 | 1 | 0 | 5 | 5 | 25 | 8 | 29 | 13 | 12 | 93 | 0 | 11 | 6 | 10 | 26 | 1 | 13 | 4 | 22 | 90 | 0 | 1 | 13 | 5 | 18 | 0 | 8 | 18 | 27 |
| Agr'l College | C. | 93 | 13 | 0 | 12 | 1 | 11 | 2 | 34 | 10 | 10 | 93 | 29 | 1 | 10 | 4 | 8 | 8 | 15 | 7 | 11 | 90 | 16 | 0 | 6 | 4 | 16 | 0 | 7 | 23 | 18 |
| Lansing, S. B. of H. | C. | 93 | 0 | 10 | 5 | 1 | 15 | 8 | 24 | 8 | 22 | 93 | 0 | 10 | 14 | 3 | 22 | 8 | 15 | 3 | 18 | 90 | 0 | 6 | 14 | 4 | 12 | 13 | 6 | 19 | 16 |
| Albion | S. C. | 93 | 38 | 3 | 3 | 2 | 8 | 5 | 19 | 10 | 5 | 93 | 32 | 8 | 9 | 4 | 13 | 8 | 11 | 4 | 4 | --- -- | ------ | ---- | ---- | ---- | ---- | -- | ---- | ---- | ---- |
| Ann Arbor | S. C. | 93 | 6 | 12 | 2 | 13 | 7 | 12 | 10 | 19 | 12 | 93 | 11 | 26 | 6 | 12 | 5 | 15 | 4 | 7 | 7 | 90 | 7 | 4 | 2 | 18 | 7 | 9 | 7 | 24 | 12 |
| Battle Creek | S. C. | 93 | 4 | 8 | 2 | 1 | 10 | 18 | 11 | 25 | 14 | 93 | 6 | 0 | 8 | 9 | 9 | 19 | 7 | 16 | 19 | 90 | 1 | 3 | 13 | 9 | 12 | 9 | 7 | 19 | 17 |
| Marshall | S. C. | 93 | 1 | 7 | 7 | 2 | 5 | 16 | 25 | 18 | 12 | 93 | 0 | 18 | 13 | 10 | 3 | 16 | 21 | 8 | 4 | 90 | 0 | 7 | 5 | 12 | 14 | 4 | 16 | 19 | 13 |
| Tecumseh | S. C. | 93 | 19 | 11 | 7 | 1 | 11 | 16 | 12 | 3 | 13 | 93 | 24 | 24 | 6 | 6 | 15 | 5 | 9 | 2 | 2 | 90 | 13 | 8 | 11 | 3 | 17 | 6 | 12 | 5 | 20 |
| Birmingham | S. E. | 74 | 20 | 7 | 4 | 4 | 3 | 9 | 14 | 9 | 4 | 77 | 24 | 10 | 10 | 0 | 3 | 9 | 6 | 4 | 11 | 70 | 17 | 8 | 8 | 6 | 1 | 3 | 5 | 8 | 14 |

*† For these references see foot-notes to this table on page 65.

NOTE.—Graphic representations of statements for 8 lines of this table are given in Diagram XII., page 64, which is explained on page 58.

TABLE XIV.—CONCLUDED.—*Direction of Wind, Months in 1893.—Observations at which the Wind was blowing from Directions named.*

| Stations in Michigan.* | Divisions of the State.* | October. | | | | | | | | | | November. | | | | | | | | | | December. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S.W. | W. | N W | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S.W. | W. | N.W | Total. | Calm. | N. | N.E. | E. | S.E. | S. | S.W. | W. | N.W |
| Av. 8 stations† | -------- | 92 | 8 | 3 | 2 | 3 | 23 | 13 | 19 | 11 | 12 | 90 | 7 | 2 | 1 | 1 | 13 | 13 | 27 | 18 | 8 | 92 | 6 | 4 | 4 | 4 | 7 | 12 | 25 | 15 | 14 |
| Rockland | U. P. | 88 | 3 | 24 | 3 | 31 | 0 | 21 | 2 | 4 | 0 | 90 | 5 | 30 | 0 | 13 | 11 | 11 | 0 | 12 | 8 | 82 | 2 | 22 | 3 | 16 | 12 | 10 | 2 | 9 | 6 |
| Traverse City | N. W. | 93 | 10 | 10 | 3 | 0 | 5 | 22 | 23 | 7 | 13 | 90 | 10 | 2 | 0 | 2 | 5 | 19 | 22 | 16 | 14 | 93 | 13 | 9 | 5 | 1 | 2 | 20 | 21 | 10 | 12 |
| Harrisville | N. E. | 93 | 0 | 0 | 1 | 0 | 27 | 0 | 52 | 0 | 13 | 90 | 0 | 0 | 1 | 0 | 7 | 0 | 71 | 0 | 11 | 93 | 0 | 0 | 6 | 9 | 7 | 0 | 51 | 1 | 28 |
| Ashton | N. C. | 93 | 2 | 0 | 1 | 0 | 15 | 10 | 42 | 6 | 17 | 84 | 0 | 0 | 1 | 4 | 15 | 6 | 17 | 32 | 9 | ------ | ------ | ---- | ---- | ---- | ---- | -- | ---- | ---- | ---- |
| Thornville | B. & E. | 93 | 0 | 0 | 0 | 2 | 37 | 2 | 15 | 23 | 14 | 90 | 0 | 0 | 1 | 1 | 30 | 1 | 22 | 33 | 2 | 93 | 0 | 3 | 4 | 4 | 14 | 4 | 25 | 17 | 22 |
| Agr'l College | C. | 93 | 13 | 0 | 0 | 2 | 29 | 9 | 23 | 11 | 6 | 90 | 18 | 0 | 0 | 0 | 18 | 4 | 31 | 14 | 5 | 91 | 2 | 0 | 7 | 7 | 11 | 3 | 40 | 12 | 9 |
| Lansing, S. B. of H. | C. | 93 | 0 | 0 | 2 | 0 | 27 | 19 | 18 | 4 | 23 | 90 | 0 | 2 | 3 | 0 | 20 | 12 | 26 | 15 | 12 | 93 | 0 | 5 | 3 | 1 | 13 | 15 | 23 | 16 | 17 |
| Albion | S. C. | 93 | 31 | 0 | 0 | 3 | 11 | 20 | 26 | 9 | 11 | 90 | 23 | 2 | 1 | 2 | 8 | 3 | 41 | 3 | 7 | 93 | 18 | 5 | 4 | 23 | 4 | 9 | 33 | 6 | 11 |
| Ann Arbor | S. C. | 93 | 14 | 3 | 0 | 13 | 11 | 21 | 7 | 16 | 8 | 90 | 10 | 1 | 1 | 4 | 10 | 18 | 14 | 25 | 7 | 93 | 15 | 7 | 2 | 5 | 2 | 20 | 16 | 18 | 8 |
| Battle Creek | S. C. | 93 | 2 | 2 | 5 | 1 | 40 | 16 | 7 | 9 | 11 | 90 | 4 | 4 | 1 | 1 | 10 | 31 | 10 | 26 | 3 | 93 | 10 | 3 | 0 | 9 | 5 | 22 | 7 | 33 | 4 |
| Marshall | S. C. | 93 | 0 | 2 | 0 | 2 | 12 | 25 | 26 | 15 | 11 | ------ | ------ | ---- | ---- | ---- | ---- | -- | ---- | ---- | ---- | ------ | ------ | ---- | ---- | ---- | ---- | -- | ---- | ---- | ---- |
| Tecumseh | S. C. | 93 | 19 | 4 | 0 | 8 | 23 | 9 | 11 | 7 | 12 | 90 | 15 | 1 | 3 | 3 | 14 | 10 | 23 | 14 | 7 | 93 | 5 | 2 | 4 | 6 | 5 | 23 | 27 | 8 | 13 |
| Birmingham | S. E. | 85 | 24 | 9 | 3 | 4 | 4 | 12 | 7 | 16 | 6 | 87 | 14 | 9 | 0 | 0 | 2 | 18 | 16 | 18 | 10 | 88 | 10 | 8 | 2 | 6 | 5 | 15 | 19 | 16 | 12 |

*† For these references see foot-notes to this table on page 65.

NOTE.—Diagram XII., page 64, exhibits lines showing, by months, directions of wind at each of 8 stations in this table; for each month and station, the diagram represents the figures given in this table for the same month and stations; it is explained on page 58.

TABLE XV.—*Average Daily Range of Atmospheric Pressure (as determined from three daily observations) for Months and Year 1893, at 12 Stations, also average line for 8 Stations* in Michigan—Stations arranged in order by Latitude, those farthest North first.*

| Stations in Michigan.* | Average Daily Range of Barometer—Year and Months, 1893. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Norm. † | 1892. | 1893. | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sept | Oct. | Nov. | Dec. |
| Av. for 8 Stations ‡ | ----- | ----- | .227 | .253 | .366 | .290 | .288 | .175 | .138 | .151 | .123 | .167 | .225 | .213 | .329 |
| Rockland | ------ | .221 | ¶ | [f] .208 | [h] .364 | [a] .297 | [f] .355 | ----- | [b] .145 | [e] .176 | [j] .141 | [h] .211 | [g] .246 | [d] .185 | [f] .314 |
| Traverse City | $.216^{12}$ | .203 | .223 | .233 | .373 | .293 | .320 | .163 | .137 | .160 | .134 | .183 | .225 | .216 | .352 |
| Harrisville | ----- | .211 | § | .259 | .382 | .315 | .319 | .200 | .155 | .181 | .183 | .187 | .271 | ----- | ----- |
| Thornville | $.216^{10}$ | .201 | .240 | .290 | .388 | .306 | .300 | .180 | .145 | .165 | .127 | .164 | .247 | .236 | .335 |
| Agr'l College | $.202^{11}$ | .191 | .206 | .229 | .353 | .252 | .260 | .145 | .127 | .142 | .128 | .152 | .207 | .184 | .295 |
| Lansing, S. B. of H. | $.206^{12}$ | .193 | .230 | .254 | .368 | .300 | .294 | .177 | .143 | .151 | .127 | .171 | .237 | .218 | .324 |
| Birmingham | $.210^{7}$ | .197 | .233 | [c] .289 | [d] .374 | .305 | [b] .273 | [c] .193 | [i] .138 | [b] .161 | [a] .131 | [b] .166 | [b] .238 | .217 | [a] .332 |
| Battle Creek | $.211^{2}$ | .196 | .226 | .246 | .360 | .295 | .288 | .196 | .134 | .140 | .107 | .155 | .203 | .217 | .368 |
| Ann Arbor | $.206^{12}$ | .191 | .229 | .251 | .371 | .297 | .278 | .175 | .144 | .154 | .121 | .186 | .226 | .213 | .327 |
| Marshall | ------ | .189 | ** | .248 | .352 | .290 | .271 | .168 | .130 | .119 | .118 | .154 | [a] .225 | ----- | ----- |
| Albion | ------ | ----- | †† | .320 | .393 | [a] .295 | .279 | .193 | 135 | .139 | [c] .117 | ----- | .228 | .207 | .290 |
| Tecumseh | $.205^{2}$ | .193 | .216 | .253 | .342 | .271 | .291 | .170 | .136 | .135 | .112 | .159 | .217 | .203 | .300 |

* The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2. The average atmospheric pressure at each of these stations, by months in 1893, is given in Table XVII., page 72.

† Numbers in this column state the average daily range of atmospheric pressure for periods of years ending in each case with Dec. 31, 1893. The small figures above and at the right of numbers which state the average daily range, denote the number of years included in the average.

‡ Not including Albion, Rockland, Harrisville, and Marshall.

¶ The average for 11 months is .240. § For 10 months, .240. ** For 10 months, .208. †† For 11 months, .236.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 24 days. f For 23 days. g For 22 days. h For 21 days. i For 19 days. j For 18 days.

NOTE.—The latitude and elevations of some of the stations in Table XV. are stated in Exhibit 2, page 3.

The daily range is found by subtracting the lowest observation from the highest observation, 7 A. M. to 7 A. M.

TABLE XVI.—*Range of Atmospheric Pressure (as determined from 3 Daily Observations) for the Year and for each Month and for the Average Month of the Year 1893, at 8 and at each of the 8 Stations, and Average Line for 8 Stations in Michigan; also the Norm.—Average Monthly Range for a series of years. Stations named in order by Latitude, those farthest North first.*

| Stations in Michigan. | Range of Barometer.—Year and Months, 1893. | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Norm. † | 1892. | 1893. | Av. Month | Jan. | Feb. | Mar. | Apr. | May. | Jun. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
| For 8 stations ‡ | ...... | ..... | 2.137 | 1.361 | 1.552 | 1.868 | 1.408 | 1.503 | 1.356 | .853 | .878 | .904 | 1.031 | 1.761 | 1.481 | 1.731 |
| Av. for 8 stations ¶ | ...... | ..... | 1.680 | .969 | 1.110 | 1.482 | 1.066 | 1.138 | .955 | .591 | .487 | .489 | .616 | 1.256 | 1.135 | 1.313 |
| Rockland | ...... | 1.439 | ..... | § | [g] .875 | [h] 1.373 | [a] 1.110 | [e] 1.160 | ..... | [b] .573 | [e] .636 | [i] .631 | [h] .917 | [f] .963 | [d] .963 | [f] 1.280 |
| Traverse City | .965$^{12}$ | 1.614 | 1.623 | .982 | 1.107 | 1.457 | 1.165 | 1.185 | .839 | .521 | .579 | .513 | .733 | 1.084 | 1.157 | 1.438 |
| Harrisville | ...... | 1.543 | ..... | ‖ | 1.194 | 1.508 | 1.169 | 1.184 | 1.017 | .604 | .579 | .506 | .692 | 1.407 | ..... | ..... |
| Ashton | ...... | ..... | ..... | ‡‡ | .863 | 1.241 | 1.055 | 1.102 | .884 | .448 | .506 | .473 | .599 | 1.150 | 1.048 | ..... |
| Thornville | .956$^{10}$ | 1.319 | 1.757 | .995 | 1.127 | 1.488 | 1.027 | 1.107 | 1.023 | .638 | .487 | .489 | .586 | 1.415 | 1.206 | 1.344 |
| Agr'l College | .918$^{11}$ | 1.384 | 1.642 | .937 | 1.093 | 1.514 | .968 | 1.129 | .955 | .566 | .474 | .615 | .572 | 1.141 | 1.031 | 1.181 |
| Lansing, S. B. of H. | .919$^{12}$ | 1.342 | 1.688 | .977 | 1.130 | 1.453 | 1.085 | 1.179 | .951 | .594 | .488 | .462 | .626 | 1.262 | 1.174 | 1.322 |
| Birmingham | .939$^{7}$ | 1.269 | 1.783 | .980 | [c] 1.108 | [d] 1.521 | 1.021 | [b] 1.129 | [c] 1.048 | [i] .586 | [b] .491 | [a] .518 | [b] .543 | [b] 1.405 | 1.131 | [a] 1.260 |
| Battle Creek | .920$^{3}$ | 1.421 | 1.645 | .966 | 1.012 | 1.460 | 1.156 | 1.147 | .981 | .571 | .449 | .409 | .618 | [a] 1.218 | 1.128 | 1.440 |
| Ann Arbor | .916$^{12}$ | 1.331 | 1.650 | .966 | 1.135 | 1.481 | 1.058 | 1.075 | .981 | .633 | .471 | .432 | .614 | 1.280 | 1.142 | 1.288 |
| Marshall | ...... | 1.366 | ..... | ** | 1.046 | 1.477 | 1.145 | 1.139 | .928 | .555 | .450 | .434 | .596 | 1.140 | ..... | ..... |
| Albion | ...... | ..... | ..... | †† | 1.264 | 1.624 | [a] 1.070 | 1.154 | .949 | .535 | .583 | .431 | ..... | 1.134 | 1.117 | 1,246 |
| Tecumseh | .936$^{2}$ | 1.254 | 1.648 | .951 | 1.097 | 1.479 | 1.049 | 1.151 | .865 | .617 | .455 | .476 | .639 | 1.243 | 1.107 | 1.233 |

† Numbers in this column state the average monthly range of atmospheric pressure for a period of years ending in each case with December 31, 1893. The small figures above and at the right of numbers which state the average, denote the number of years included in the average.

‡ Represents the difference between the highest of 8 stations and the lowest of 8 stations for year and for each month of year, not including Ashton, Albion, Rockland, Harrisville, and Marshall.

¶ Represents sum of ranges at 8 stations divided by 8.

§ The average for 11 months is .953. ‖ For 10 months, .986. ** For 10 months, .891. †† For 11 months, 1.010. ‡‡ For 11 months, .852.

a, b, c. In the columns from January to December, inclusive, the letters a, b, c, etc., stand directly above the numbers from which they refer to the notes below.

a For 30 days. b For 29 days. c For 28 days. d for 27 days. e For 25 days. f For 24 days. g For 23 days. h For 22 days. i For 21 days.

NOTE.—The statements in the star (*) foot-note to Table XV. apply also to Table XVI.

EXHIBIT 35.—*Average Atmospheric Pressure, by Year and Months, in 1893, compared with Annual and Monthly Averages for 1892, and for the 16 years, 1877–92. These Averages are for Groups of several Stations in Michigan.*

| Years, etc. | Average Atmospheric Pressure.—Inches of Mercury. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 16 years, 1877-92* | 29.147 | 29.175 | 29.173 | 29.143 | 29.131 | 29.106 | 29.091 | 29.120 | 29.144 | 29.188 | 29.171 | 29.158 | 29.161 |
| 1892 (12 stations) | 29.096 | 29.068 | 29.143 | 29.117 | 29.118 | 28.995 | 29.017 | 29.156 | 29.104 | 29.152 | 29.096 | 29.090 | 29.101 |
| 1893 (8 stations) | 29.060 | 28.977 | 29.124 | 29.067 | 29.000 | 28.982 | 29.066 | 29.077 | 29.111 | 29.086 | 29.079 | 29.059 | 29.093 |
| In 1893 Greater than Av. for 16 years, 1877-92 | ------- | ----- | ----- | ------ | ------ | ----- | ---- | ----- | ----- | ----- | ----- | ------ | ------ |
| In 1893 Less than Av. for 16 years, 1877-92 | .087 | .198 | .049 | .076 | .131 | .124 | .025 | .043 | .033 | .102 | .092 | .099 | .068 |
| In 1893 Greater than in 1892 | ------- | ----- | --- | ----- | ----- | ----- | .049 | ----- | .007 | ----- | ----- | ------ | ------ |
| In 1893 Less than in 1892 | .036 | .091 | .019 | .050 | .118 | .013 | ------ | .079 | ----- | .066 | .017 | .031 | .008 |

* Woodmere Cemetery (near Detroit) for 1877-79; Mendon for 1877-78, 1881--83; Benton Harbor for 1877-78; Ypsilanti for 1877, 1879; Otisville for 1878-80, 1882; Washington for 1879-80, 1882-83; Nirvana for 1879 and in 1880 to April 25 inclusive; Reed City for 1880 after April 25 and 1881-85; Hastings for 1882; Hillsdale for 1882-83; Manistique for 1884-85; Mackinaw City for 1884-87; Ionia for 1884-85; Swartz Creek for 1885; Port Austin for 1883-84, 1888-89; Marquette for 1879-84, 1886-87; Escanaba for 1880, 1882-87; Alpena, Grand Haven, Port Huron, for 1879-87; Detroit for 1878-87; Kalamazoo for 1877-82, 1885-89; Alma for 1890; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Thornville for 1880-81, 1884-92; Tecumseh for 1879-80, 1882-85, 1890, 1892; Birmingham for 1887-92; Battle Creek for 1877-80, 1882, 1888-89, 1891-92; Lansing for 1879-92; Agricultural College for 1877, 1881-92; Ann Arbor for 1881-92; Traverse City for 1882-92; Harrisville for 1882, 1885-92; Albion for 1890-91; Rockland for 1891-92.

EXHIBIT 36.—*Comparisons of the Average Atmospheric Pressure during the Year and during each Month of the Year 1893, with Averages for the 18 Years, 1875–92, and for the year 1892. Corrected for Temperature and for Instrumental Error. Observations made at 7 A. M., 2 P. M. and 9 P. M., Daily, by Prof. R. C. Kedzie, at the State Agricultural College, near Lansing, Michigan.*

| Years, etc. | Average Atmospheric Pressure.—Inches of Mercury. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 18 years, 1875-92 | 29.070 | 29.082 | 29.074 | 29.039 | 29.047 | 29.036 | 29.039 | 29.068 | 29.085 | 29.122 | 29.087 | 29.083 | 29.084 |
| 1892 | 29.096 | 29.064 | 29.133 | 29.121 | 29.107 | 29.003 | 29.019 | 29.178 | 29.111 | 29.132 | 29.096 | 29.098 | 29.092 |
| 1893 | 29.019 | 28.995 | 39.102 | 29.050 | 28.965 | 28.971 | 29.079 | 29.056 | 29.106 | 28.980 | 28.967 | 28.985 | 28.971 |
| In 1893 Greater than Av. for 18 years, 1875-92 | ------- | ------ | .028 | .011 | ------ | ------ | .040 | ------ | .021 | ---- | ------ | ------ | ------ |
| In 1893 Less than Av. for 18 years, 1875-92 | .051 | .087 | ---- | ------ | .082 | .065 | ------ | .012 | ------ | .142 | .120 | .098 | .118 |
| In 1893 Greater than in 1892 | ------- | ------ | ------ | ------ | ------ | ------ | .060 | ------ | ------ | ------ | ------ | ------ | ------ |
| In 1893 Less than in 1892 | .077 | .069 | .031 | .071 | .142 | .032 | ------ | .122 | .005 | .152 | .129 | 1.13 | .121 |

TABLE XVII.—*Average Atmospheric Pressure for Months and Year 1893, at 13 Stations in Michigan; also Average line for 8 Stations, as indicated by the height, in inches, of Mercury in the Barometer Corrected for Temperature.—Reduced to 32° F. (for some stations not corrected for instrumental errors*).—Average of Observations made Daily at 7 A. M., 2 P. M. and 9 P. M., by observers† for the State Board of Health.*

| Stations in Michigan.† | Divisions of the State ‡ | Inches of Mercury.—Atmospheric Pressure. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Years. | | Months, 1893. | | | | | | | | | | | |
| | | Norm.‖ | 1893. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. for 8 stations ¶ | ........ | ........ | 29.060 | 28.977 | 29.124 | 29.067 | 29.000 | 28.982 | 29.066 | 29.077 | 29.111 | 29.086 | 29.079 | 29.059 | 29.093 |
| Rockland | U. P. | ........ | ** | g28.621 | h28.712 | a28.628 | e28.536 | ........ | b28.611 | e28.649 | i28.699 | h28.651 | f28.567 | d28.570 | f28.683 |
| Traverse City | N. W. | 29.329$^{12}$ | 29.269 | 29.215 | 29.364 | 29.294 | 29.206 | 29.179 | 29.203 | 29.282 | 29.353 | 29.341 | 29.273 | 29.228 | 29.293 |
| Harrisville | N. E. | ........ | ‡‡ | 29.139 | 29.267 | 29.218 | 29.189 | 29.124 | 29.200 | 29.194 | 29.252 | 29.237 | 29.209 | ........ | ........ |
| Ashton | N. C. | ........ | †† | 28.526 | 28.620 | 28.602 | 28.562 | 28.554 | 28.638 | 28.634 | 28.677 | 28.668 | 28.679 | 28.590 | ........ |
| Thornville | B. & E. | 28.952$^{14}$ | 28.915 | 28.835 | 28.965 | 28.918 | 28.881 | 28.828 | 28.926 | 28.928 | 28.961 | 28.956 | 28.945 | 28.904 | 28.935 |
| Agricultural College | C. | 29.084$^{12}$ | 29.019 | 28.995 | 29.102 | 29.050 | 28.965 | 28.971 | 29.079 | 29.056 | 29.106 | 28.980 | 28.967 | 28.985 | 28.971 |
| Lansing, S. B. of H. | C. | 29.057$^{15}$ | 29.044 | 28.956 | 29.105 | 29.053 | 28.981 | 28.958 | 29.055 | 29.062 | 29.092 | 29.074 | 29.064 | 29.048 | 29.075 |
| Albion | S. C. | ........ | §§ | 28.821 | 28.968 | a28.907 | 28.848 | 28.659 | 28.926 | 28.923 | 28.757 | ........ | 28.747 | 28.734 | 28.757 |
| Ann Arbor | S. C. | 29.030$^{13}$ | 29.010 | 28.897 | 29.068 | 29.014 | 28.952 | 28.949 | 29.019 | 29.022 | 29.039 | 29.020 | 29.044 | 29.038 | 29.052 |
| Battle Creek | S. C. | 29.056$^{3}$ | 29.031 | 28.935 | 29.084 | 29.025 | 28.957 | 28.946 | 29.037 | 29.048 | 29.061 | 29.063 | a29.068 | 29.038 | 29.104 |
| Marshall | S. C. | ........ | ¶¶ | 28.901 | 29.048 | 28.994 | 28.915 | 28.899 | 28.987 | 28.992 | 29 018 | 29.000 | 29.017 | ........ | ........ |
| Tecumseh | S. C. | 29.112$^{2}$ | 29.102 | 28.998 | 29.147 | 29.086 | 29.018 | 29.013 | 29.114 | 29.117 | 29.147 | 29.136 | 29.143 | 29.131 | 29.178 |
| Birmingham | S. E. | 29.116$^{7}$ | 29.091 | c28.987 | d29.157 | 29.098 | b29.037 | c29.011 | i29.093 | b29.103 | a29.129 | b29.119 | b29.129 | 29.096 | a29.134 |

* A correction has been made for instrumental error of barometer at Agricultural College; .013 has been subtracted from each monthly average during the year 1893. For other stations the instrumental error of barometer is not known.

† The names of observers, their places of observation, and the counties in which these places are situated, are stated in Exhibit 1, page 2.

‡ The full names of divisions and the counties in each division are stated in Exhibit I., in a paper which follows, on weekly reports of sickness.

‖ Numbers in this column state the average annual atmospheric pressure for periods of years ending in each case with December 31, 1893. The small figures at the right of the numbers which state the average, denote the number of years included in the average.

¶ This line is an average for 8 stations, at which observations were made tri-daily, and from which reports, nearly complete, were received for every month in the year. It does not include Ashton, Albion, Rockland, Harrisville, and Marshall. Green's standard barometer was used at all the 13 stations for 1893.

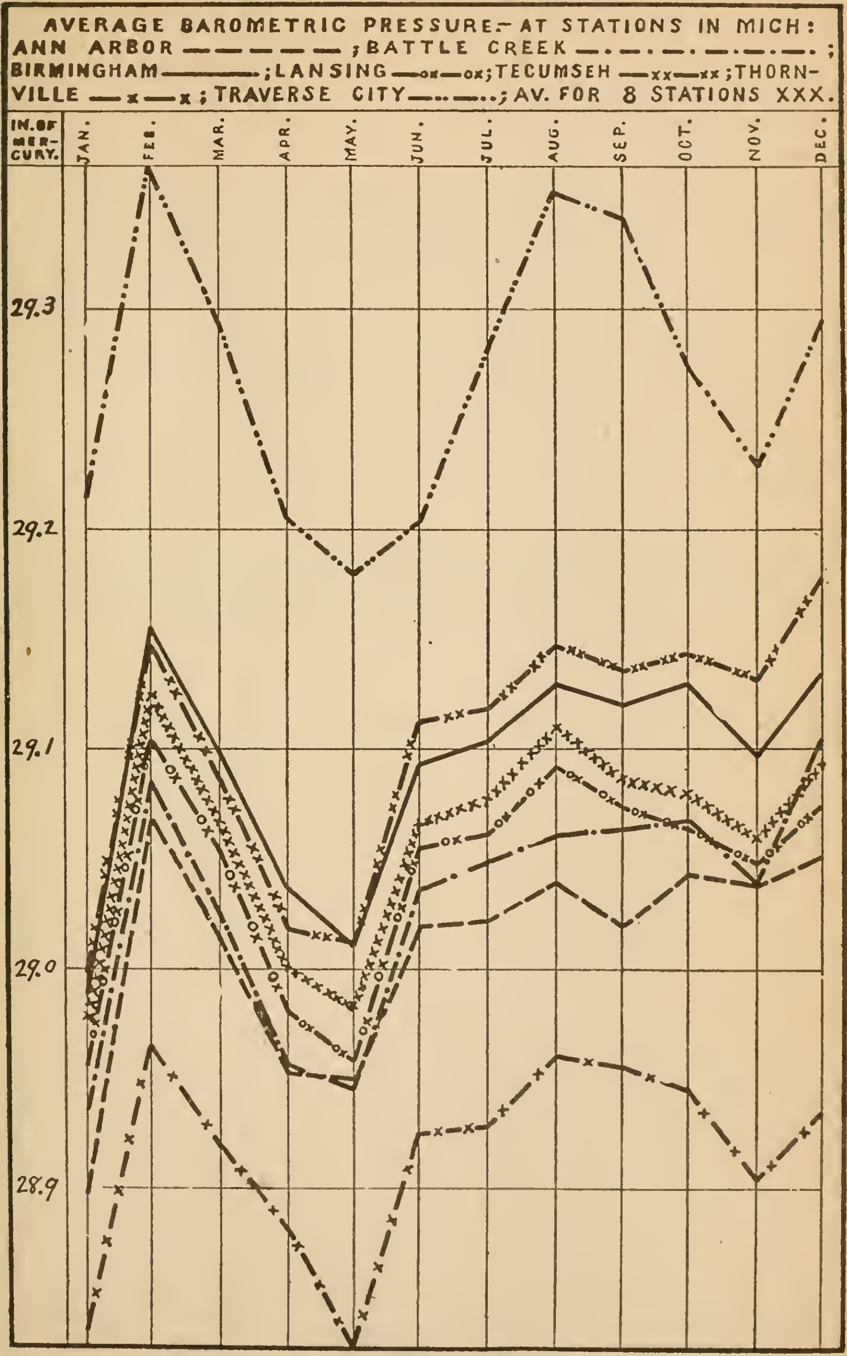
** The average for 11 months is 28.630. ‡‡ For 10 months, 29.203. †† For 11 months, 28.614. §§ For 11 months, 28.822. ¶¶ For 10 months, 28.977.

NOTE.—Computations of monthly averages for the year 1893 were furnished by the observers at Albion and Ann Arbor. The remainder of the computations were made at the office of the State Board of Health.

a For 30 days. b For 29 days. c For 28 days. d For 27 days. e For 25 days. f For 24 days. g For 23 days. h For 22 days. i For 21 days.

The lines for 7 stations in this table are graphically represented in Diagram XVI., page 73.

DIAGRAM XVI.—ATMOSPHERIC PRESSURE, BY MONTHS, IN 1893.



[Plate 757.]

EXHIBIT 37.—*Average Daily Range of Atmospheric Pressure, by Year and Months, in 1893, compared with Annual and Monthly Averages for 1892, and for the 11 Years, 1882-92. These Averages are for Groups of several Stations in Michigan.*

| Years, etc. | Average Daily Range of Barometer.—Year and Months, 1893. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 11 years, 1882-92* | .211 | .310 | .306 | .258 | .217 | .165 | .137 | .124 | 1.32 | .163 | .206 | .253 | .268 |
| 1892 (12 stations) | .199 | .236 | .256 | .236 | .239 | .213 | .129 | .135 | .121 | .142 | .198 | .241 | .246 |
| 1893 (8 stations) | .227 | .253 | .366 | .290 | .288 | .175 | .138 | .151 | .123 | .167 | .225 | .213 | .329 |
| In 1893 Greater than Av. for 11 years, 1882-92 | .016 | ----- | 060. | .032 | .071 | .010 | .001 | .027 | ----- | .004 | .019 | ----- | .061 |
| In 1893 Less than Av. for 11 years, 1882-92 | ----- | .057 | ----- | ----- | ----- | ----- | ----- | ----- | .009 | ----- | ----- | .040 | ----- |
| In 1893 Greater than in 1892 | .028 | .017 | .110 | .054 | .049 | ----- | .009 | .016 | .002 | .025 | .027 | ----- | .083 |
| In 1893 Less than in 1892 | ----- | ----- | ----- | ----- | ----- | .038 | ----- | ----- | ----- | ----- | ----- | .028 | ----- |

* Port Austin for 1883-84, 1888-89; Kalamazoo for 1886-89; Mackinaw City for 1884-87; Reed City for 1882-85; Washington, Mendon for 1883; Manistique, Ionia for 1884-85; Swartz Creek for 1885; Marquette for 1882-84, 1886-87; Escanaba, Grand Haven for 1882-87; Alpena, Port Huron, Detroit for 1883-87; Alma for 1890; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Thornville for 1884-92; Battle Creek for 1888-89, 1892; Traverse City, Lansing, Ann Arbor for 1882-92; Agricultural College for 1883-92; Harrisville for 1885-92; Birmingham for 1887-92; Albion for 1890-91; Tecumseh for 1882-85, 1890, 1892; Rockland for 1891-92.

EXHIBIT 38.—*Range of Atmospheric Pressure, by Year and Months, in 1893, compared with Annual and Monthly Averages for 1892, and for the 11 years, 1882-92. These Averages are for Groups of Several Stations in Michigan.*

| Years, etc. | Range of Barometer.—Year and Months, 1893. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Annual Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Av. 11 years, 1882-92* | .979 | 1.307 | 1.322 | 1.181 | 1.069 | .796 | .735 | .610 | .630 | 8.30 | 1.017 | 1.125 | 1.154 |
| 1892 (12 stations) | .961 | 1.084 | 1.236 | 1.164 | 1.009 | 1.064 | .641 | .783 | .477 | .798 | .996 | 1.220 | 1.065 |
| 1893 (8 stations) | .969 | 1.110 | 1.482 | 1.066 | 1.133 | .955 | .591 | .487 | .489 | .616 | 1.256 | 1.135 | 1.318 |
| In 1893 Greater than Av. for 11 years, 1882-92 | ----- | ----- | .160 | ----- | .069 | .159 | ----- | ----- | ----- | ---- | .239 | .010 | .159 |
| In 1893 Less than Av. for 11 years, 1882-92 | .010 | .197 | ----- | .115 | ----- | ----- | .144 | .123 | .141 | .214 | ----- | ----- | ----- |
| In 1893 Greater than in 1892 | .008 | .026 | .246 | ----- | .129 | ----- | ----- | ----- | .012 | ----- | .260 | ----- | .248 |
| In 1893 Less than in 1892 | ----- | ----- | ----- | .098 | ----- | .109 | .050 | .296 | ----- | .182 | ----- | .085 | ----- |

* Reed City for 1882-85; Port Austin for 1883-84, 1888-89; Washington, Mendon for 1883; Manistique, Ionia for 1884-85; Mackinaw City for 1884-87; Swartz Creek for 1885; Marquette for 1882-84, 1886-87; Escanaba, Grand Haven for 1882-87; Alpena, Port Huron, Detroit for 1883-87; Kalamazoo for 1888-89; Gulliver Lake for 1888-90, 1892; Marshall for 1883-92; Tecumseh for 1882-85, 1892; Battle Creek for 1888-89, 1891-92; Traverse City, Lansing, Ann Arbor for 1882-92; Agricultural College for 1883-92; Thornville for 1884-92; Harrisville for 1885-92; Birmingham for 1887-92; Albion for 1890-91; Rockland for 1892.

## SUNSHINE AND CLOUDS.

On the back of each blank register supplied by this Board to observers, on which they are to register meteorological data, is a statement that "One observer has reported a record of days 'all or nearly all cloudy' and days 'all or nearly all sunshine.' The State Board of Health would be glad to have such a report from all observers who can conveniently make it. Memoranda may be made in a column headed 'cloudy or sunny,' days more than 80 per cent of clouds being marked with the abbreviation 'C,' indicating *cloudy*, and days with less than 20 per cent of clouds with an 'S,' indicating *sunshine*."

The following are statements of the days in each month which were reported "Sunny," "Clear," "Fair," "Partly cloudy," and "Cloudy," by observers at stations in Michigan, except Thornville and Kalamazoo, concerning which notes are given explaining the method of statement.

### ROCKLAND.

JANUARY.—Sunny, 7, 14, 19, 20, 26, 29, 30—7 days. Cloudy, 1, 2, 3, 5, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 21, 22, 23, 24, 25, 27, 28, 31—23 days.

FEBRUARY.—Sunny, 1, 5, 6, 7, 10, 11, 13, 16, 18, 19, 20, 25, 26—13 days. Cloudy, 2, 3, 4, 8, 9, 12, 14, 15, 17, 21, 22, 23, 24, 27, 28—15 days.

MARCH.—Sunny, 1, 2, 4, 5, 6, 7, 8, 9, 15, 16, 17, 19, 22, 25, 26, 27, 28, 29, 30, 31—20 days. Cloudy, 3, 10, 11, 12, 13, 14, 18, 20, 21, 23, 24—11 days.

APRIL.—Sunny, 1, 9, 10, 14, 15, 16, 17, 23, 25—9 days. Cloudy, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 18, 19, 20, 21, 22, 24 26—17 days.*

JUNE.—Sunny, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29—22 days. Cloudy, 1, 2, 3, 4, 5, 8, 9, 30—8 days.

JULY.—Sunny, 1, 2, 3, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 31—26 days. Cloudy, 4, 11, 14, 23, 30—5 days.

AUGUST.—Sunny, 1, 2, 3, 4, 5, 6, 7, 8, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 26, 27, 29, 30, 31—23 days. Cloudy, 9, 10, 11, 17, 23, 28—6 days.

SEPTEMBER.—Sunny, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 22, 23, 28—22 days. Cloudy, 15, 21, 24, 25, 26, 27, 29, 30—8 days.

OCTOBER.—Sunny, 3, 4, 9, 10, 15, 16, 17, 18, 20, 21, 22, 23, 30, 31—14 days. Cloudy, 1, 2, 5, 6, 7, 8, 11, 12, 13, 14, 19, 24, 25, 26, 27, 28, 29—17 days.

NOVEMBER.—Sunny, 1, 3, 4, 5, 6, 7, 8, 9, 10, 16, 18, 19, 25—13 days. Cloudy, 2, 11, 12, 13, 14, 15, 17, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30—17 days.

DECEMBER.—Sunny, 2, 23, 26, 27—4 days. Cloudy, 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 24, 25, 28, 29, 30, 31—26 days.

### ASHTON.

JANUARY.—Clear, 10, 19. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31—29 days.

FEBRUARY.—Clear, 4, 5, 12, 13, 15, 16, 20, 26, 27—9 days. Cloudy, 1, 2, 3, 6, 7, 8, 9, 10, 11, 14, 17, 18, 19, 21, 22, 23, 24, 25, 28—19 days.

MARCH.—Clear, 1, 2, 4, 5, 6, 7, 10, 16, 17, 18, 19, 26, 27, 28, 29, 30, 31—17 days. Cloudy, 3, 8, 9, 11, 12, 13, 14, 15, 20, 21, 22, 23, 24, 25—14 days.

APRIL.—Clear, 1, 4, 5, 8, 9, 10, 12, 15, 17, 23, 25—11 days. Cloudy, 2, 3, 6, 7, 11, 13, 14, 16, 18, 19, 20, 21, 22, 24, 26, 27, 28, 29, 30—19 days.

MAY.—Clear, 5, 6, 7, 8, 9, 10, 17, 18, 19, 20, 21, 22, 25, 28, 29, 30, 31—17 days. Cloudy, 1, 2, 3, 4, 11, 12, 13, 14, 15, 16, 23, 24, 26, 27—14 days.

JUNE.—Clear, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27, 28, 29, 30—22 days. Cloudy, 1, 2, 3, 4, 5, 10, 20, 21—8 days.

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* No record for the rest of the month.

JULY.—Clear, 2, 3, 5, 8, 9, 10, 11, 12, 13, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31—24 days. Cloudy, 1, 4, 6, 7, 14, 17, 28—7 days.

AUGUST.—Clear, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31—28 days. Cloudy, 11, 16, 25.

SEPTEMBER.—Clear, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29—24 days. Cloudy, 12, 13, 14, 15, 21, 30—6 days.

OCTOBER.—Clear, 1, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 16, 17, 18, 21, 22, 23, 25, 27, 30, 31—21 days. Cloudy, 2, 6, 14, 15, 19, 20, 24, 26, 28, 29—10 days.

NOVEMBER.—Clear, 1, 3, 4, 5, 6, 7, 8, 16, 17—9 days. Cloudy, 2, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30—21 days.

### THORNVILLE.

In the following statement relative to Thornville (the per cent of sunshine having been recorded for each day), the days are named clear when the sky was three-tenths or less than three-tenths covered with clouds; fair, when the sky was from four-tenths to seven-tenths (inclusive) covered; cloudy, when the sky was more than seven-tenths covered,—as reported by J. S. Caulkins, M. D., Thornville.

JANUARY.—Clear, 6, 10, 17, 19, 20, 21, 29—7 days. Fair, 8, 13, 14. Cloudy, 1, 2, 3, 4, 5, 7, 9, 11, 12, 15, 16, 18, 22, 23, 24, 25, 26, 27, 28, 30, 31—21 days.

FEBRUARY.—Clear, 4, 5, 8, 11, 12, 13, 20, 22, 24, 26, 27—11 days. Fair, 10, 15, 16, 28—4 days. Cloudy, 1, 2, 3, 6, 7, 9, 14, 17, 18, 19, 21, 23, 25—13 days.

MARCH.—Clear, 1, 2, 4, 5, 6, 7, 10, 16, 17, 18, 26, 27, 28, 29, 30—15 days. Fair, 3, 9, 13, 20—4 days. Cloudy, 8, 11, 12, 14, 15, 19, 21, 22, 23, 24, 25, 31—12 days.

APRIL.—Clear, 1, 2, 4, 5, 6, 8, 9, 13, 18—9 days. Fair, 7, 10, 11, 15, 16, 17, 25, 26, 27, 28—10 days. Cloudy, 3, 12, 14, 19, 20, 21, 22, 23, 24, 29, 30—11 days.

MAY.—Sunny, 7, 8, 9, 10, 15, 18, 19, 20, 21, 22, 24, 28, 29, 30, 31—15 days. Fair, 4, 11, 14, 27—4 days. Cloudy, 1, 2, 3, 5, 6, 12, 13, 16, 17, 23, 25, 26—12 days.

JUNE.—Clear, 4, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27, 28, 29, 30—22 days. Fair, 2, 5, 10, 11, 20, 21—6 days. Cloudy, 1, 3.

JULY.—Clear, 3, 8, 9, 10, 11, 12, 15, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 29, 30, 31—20 days. Fair, 4, 5, 6, 13, 14, 16, 24, 28—8 days. Cloudy, 1, 2, 7.

AUGUST.—Clear, 1, 2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17, 20, 21, 22, 23, 24, 25, 30, 31—22 days. Fair, 5, 11, 16, 18, 19, 26, 27, 29—8 days. Cloudy, 28.

SEPTEMBER.—Clear, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 16, 17, 19, 20, 22, 25, 26, 27, 28, 29—22 days. Fair, 12, 14, 18, 23, 24—5 days. Cloudy, 13, 21, 30.

OCTOBER.—Clear, 1, 2, 4, 5, 9, 10, 11, 12, 16, 17, 18, 21, 22, 23, 25—15 days. Fair, 7, 8, 19, 24, 30—5 days. Cloudy, 3, 6, 13, 14, 15, 20, 26, 27, 28, 29, 31—11 days.

NOVEMBER.—Clear, 3, 4, 5, 6, 7, 8, 10, 16, 17, 18, 20—11 days. Fair, 1, 13, 14, 19, 26—5 days. Cloudy, 2, 9, 11, 12, 15, 21, 22, 23, 24, 25, 27, 28, 29, 30—14 days.

DECEMBER.—Clear, 4, 7, 13, 19, 20, 21, 23, 27—8 days. Fair, 26. Cloudy, 1, 2, 3, 5, 6, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 22, 24, 25, 28, 29, 30, 31—22 days.

### ALBION.

JANUARY.—Sunny, 10. Fair, 4, 5, 6, 7, 9, 12, 13, 14, 15, 16, 17, 18, 19, 21, 25, 29—16 days. Cloudy, 1, 2, 3, 8, 11, 20, 22, 23, 24, 26, 27, 28, 30, 31—14 days.

FEBRUARY.—Sunny, 12, 13, 16, 20, 26—5 days. Fair, 3, 4, 5, 15, 16, 19, 27, 28—7 days. Cloudy, 1, 2, 6, 7, 8, 9, 10, 11, 14, 17, 18, 21, 22, 23, 24, 25—16 days.

MARCH.—Sunny, 1, 4, 7, 13, 17, 26, 27, 28, 29—9 days. Fair, 2, 3, 5, 6, 9, 10, 15, 16, 18, 19, 21, 30—12 days. Cloudy, 8, 11, 12, 14, 20, 22, 23, 24, 25, 31—10 days.

APRIL.—Sunny, 4, 13. Fair, 1. 2, 3, 5, 8, 9, 10, 12, 15, 16, 17, 22, 27, 28, 29—15 days. Cloudy, 6, 7, 11, 14, 18, 19, 20, 21, 23, 24, 25, 26, 30—13 days.

MAY.—Sunny, 6, 7, 8, 9, 10, 18, 19, 20, 21, 24, 28, 30—12 days. Fair, 3, 4, 5, 12, 15, 16, 17, 22, 23, 27, 29, 31—12, days. Cloudy, 1, 2, 11, 13, 14, 25, 26—7 days.

JUNE.—Sunny, 4, 6, 7, 8, 9, 11, 12, 13, 14, 17, 18, 19, 23, 24, 27, 28, 29—17 days. Fair, 1, 2, 15, 16, 20, 21, 22, 25, 26, 30—10 days. Cloudy, 3, 5, 10.

JULY.—Sunny, 3, 9, 10, 11, 19, 20, 21, 23, 24, 29, 30, 31—12 days. Fair, 1, 2, 4, 5, 7, 8, 12, 13, 14, 15, 16, 17, 18, 22, 25, 26, 27—17 days. Cloudy, 6, 28.

AUGUST.—Sunny, 1, 2, 3, 4, 5, 7, 8, 9, 10, 12, 14, 15, 21, 23, 30, 31—16 days. Fair, 6, 13, 17, 18, 19, 20, 22, 24, 25, 26, 27, 29—12 days. Cloudy, 11, 16, 28.

OCTOBER.—Sunny, 1, 4, 5, 9, 10, 11, 12, 16, 17, 18, 22, 23, 25, 29—14 days. Fair, 2, 7, 8, 15, 19, 20, 21, 24, 27, 28, 30, 31—12 days. Cloudy, 3, 6, 13, 14, 26—5 days.

NOVEMBER.—Sunny, 3, 4, 5, 6, 7, 8, 9, 16, 20—9 days. Fair, 1, 10, 13, 14, 17, 19, 25, 26—8 days. Cloudy, 2, 11, 12, 15, 18, 21, 22, 23, 24, 27, 28, 29, 30—13 days.

DECEMBER.—Sunny, 20. Fair, 3, 4, 5, 7, 8, 18, 19, 21, 23, 27—10 days. Cloudy, 1, 2, 6, 9, 10, 11, 12, 13, 14, 15, 16, 17, 22, 24, 25, 26, 28, 29, 30, 31—20 days.

### ANN ARBOR.

JANUARY.—Sunny, 19. Fair, 3, 4, 6, 7, 9, 10, 12, 13, 14, 17, 20, 21, 29, 30—14 days. Cloudy, 1, 2, 5, 8, 11, 15, 16, 18, 22, 23, 24, 25, 26, 27, 28, 31—16 days.

FEBRUARY.—Sunny, 12, 13, 20, 26—4 days. Fair, 3, 4, 8, 16, 19, 22, 27, 28—8 days. Cloudy, 1, 2, 5, 6, 7, 9, 10, 11, 14, 15, 17, 18, 21, 23, 24, 25—16 days.

MARCH.—Sunny, 1, 7, 17, 18, 27, 28—6 days. Fair, 2, 4, 5, 6, 9, 13, 15, 16, 19, 24, 26, 29, 30—13 days. Cloudy, 3, 8, 10, 11, 12, 14, 20, 21, 22, 23, 25, 31—12 days.

APRIL.—Sunny, 4, 9, 13. Fair, 1, 2, 3, 8, 10, 15, 16, 17, 25, 27, 29—11 days. Cloudy, 5, 6, 7, 11, 12, 14, 18, 19 20, 21, 22, 23, 24, 26, 28, 30—16 days.

MAY.—Sunny, 4, 6, 7, 8, 9, 10, 18, 19, 20, 21, 28, 30—12 days. Fair, 3, 15, 23, 24, 25, 27, 29, 31—8 days. Cloudy 1, 2, 5, 11, 12, 13, 14, 16, 17, 22, 26—11 days.

JUNE.—Sunny, 4, 7, 8, 9, 12, 13, 14, 16, 17, 18, 19, 23, 24, 26, 29—15 days. Fair, 2, 5, 6, 11, 15, 20, 21, 22, 25, 27, 28, 30—12 days. Cloudy, 1, 3, 10.

JULY.—Sunny, 3, 10, 19, 20, 21, 23, 26, 27, 30, 31—10 days. Fair, 1, 2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 22, 24, 25, 29—20 days. Cloudy, 28.

AUGUST.—Sunny, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 19, 21, 22, 23, 30, 31—19 days. Fair, 11, 13, 17, 18, 20, 24, 25, 26, 27, 29—10 days. Cloudy, 16, 28.

SEPTEMBER.—Sunny, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 17, 19, 26, 27, 28—15 days. Fair, 10, 13, 14, 15, 16, 20, 21, 23, 25 29—10 days. Cloudy, 12, 18, 22, 24, 30—5 days.

OCTOBER.—Sunny, 1, 4, 5, 7, 9, 10, 11, 12, 13, 17, 18, 21, 22, 23—14 days. Fair. 2, 8, 16, 19, 20, 25, 29, 30, 31—9 days. Cloudy, 3, 6, 14, 15, 24, 26, 27, 28—8 days.

NOVEMBER.—Sunny, 3, 6, 7, 16—4 days. Fair, 1, 4, 5, 8, 9, 10, 11, 13, 14, 18, 19, 20, 25, 26—14 days. Cloudy, 2, 12, 15, 17, 21, 22, 23, 24, 27, 28, 29, 30—12 days.

DECEMBER.—Sunny, 21. Fair, 4, 5, 7, 8, 19, 20, 23, 25, 27—9 days. Cloudy, 1, 2, 3, 6, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 24, 26, 28, 29, 30, 31—21 days.

### BATTLE CREEK.

JANUARY.—Sunny, 4, 6, 7, 10, 12, 13, 15, 17, 18, 19, 20, 25, 29—13 days. Cloudy, 1, 2, 3, 5, 8, 9, 11, 14, 16, 21, 22, 23, 24, 26, 27, 28, 30, 31—18 days.

FEBRUARY.—Sunny, 3, 4, 7, 8, 12, 13, 16, 19, 20, 27, 28—11 days. Cloudy, 1, 2, 5, 6, 9, 10, 11, 14, 15, 17, 18, 21, 22, 23, 24, 25, 26—17 days.

MARCH.—Sunny, 1, 2, 3, 4, 5, 6, 7, 9, 10, 13, 15, 17, 18, 19, 21, 27, 28, 29, 30, 31—20 days. Cloudy, 8, 11, 12, 14, 16, 20, 22, 23, 24, 25, 26—11 days.

APRIL.—Sunny, 1, 2, 4, 5, 8, 9, 10, 12, 13, 15, 16, 17, 27—13 days. Cloudy, 3, 6, 7, 11, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30—17 days.

MAY.—Sunny, 3, 4, 6, 7, 8, 9, 10, 15, 17, 18, 19, 20, 21, 22, 24, 25, 28, 29, 30, 31—20 days. Cloudy, 1, 2, 5, 11, 12, 13, 14, 16, 23, 26, 27—11 days.

JUNE.—Sunny, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29—22 days. Cloudy, 1, 2, 3, 10, 15, 16, 20, 30—8 days.

JULY.—Sunny, 1, 2, 3, 7, 8, 9, 10, 11, 12, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31—24 days. Cloudy, 4, 5, 6, 13, 14, 16, 17—7 days.

AUGUST.—Sunny, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 24, 25, 26, 27, 29, 30, 31—27 days. Cloudy, 16, 17, 23, 28—4 days.

### LANSING.

JANUARY.—Sunny, 10, 12, 19, 29—4 days. Fair, 17, 21. Cloudy, 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 16, 18, 20, 22, 23, 24, 25, 26, 27, 28, 30, 31—25 days.

FEBRUARY.—Sunny, 4, 12, 13, 20, 26, 28—6 days. Cloudy, 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 27—22 days.

MARCH.—Sunny, 1, 4, 5, 6, 7, 10, 17, 18, 26, 27, 28, 30—12 days. Partly cloudy, 2, 29. Cloudy, 3, 8, 9, 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 23, 24, 25, 31—17 days.

April.—Sunny, 4, 8, 12, 13, 15—5 days. Partly cloudy, 1, 9. Cloudy, 2, 3, 5, 6, 7, 10, 11, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30—23 days.

May.—Sunny, 7, 8, 9, 17, 18, 19, 20, 21, 24, 28, 30—11 days. Partly cloudy, 6, 10. Cloudy, 1, 2, 3, 4, 5, 11, 12, 13, 14, 15, 16, 22, 23, 25, 26, 27, 29, 31—18 days.

June.—Sunny, 7, 8, 9, 12, 13, 14, 17, 18, 19, 23, 24, 25, 26, 27, 28, 29, 30—17 days. Partly cloudy, 4, 11, 22. Cloudy, 1, 2, 3, 5, 6, 10, 15, 16, 20, 21—10 days.

July.—Sunny, 3, 19, 21, 23, 24, 26, 27, 29, 30—9 days. Partly cloudy, 9, 10, 11, 12, 18, 20, 22, 25, 31—9 days. Cloudy, 1, 2, 4, 5, 6, 7, 8, 13, 14, 15, 16, 17, 28—13 days.

August.—Sunny, 1, 2, 3, 4, 6, 7, 8, 9, 10, 14, 15, 23, 24, 30, 31—15 days. Partly cloudy, 5, 12, 13, 20, 21, 22, 29—7 days. Cloudy, 11, 16, 17, 18, 19, 25, 26, 27, 28—9 days.

September.—Sunny, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 17, 27, 28, 29—15 days. Partly cloudy, 1, 19, 21, 22, 23, 26—6 days. Cloudy, 12, 13, 14, 16, 18, 20, 24, 25, 30—9 days.

October.—Sunny, 1, 4, 5, 7, 9, 10, 11, 12, 16, 17, 18, 21, 22, 23, 25—15 days. Partly cloudy, 2, 19, 20, 31—4 days. Cloudy, 3, 6, 8, 13, 14, 15, 24, 26, 27, 28, 29, 30—12 days.

November.—Sunny, 1, 3, 4, 5, 6, 7, 8, 13—8 days. Partly cloudy, 10, 11, 16, 17, 26—5 days. Cloudy, 2, 9, 12, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 30—17 days.

December.—Sunny, 4, 21, 23, 27—4 days. Partly cloudy, 8, 20, 24, 26—4 days. Cloudy, 1, 2, 3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 25, 28, 29, 30, 31—23 days.

### MARQUETTE.

January.—Cloudless days, 6. Partly, cloudly, 7. Cloudy, 18.

February.—Cloudless days, 10. Partly cloudy, 3. Cloudy, 15.

March.—Cloudless days, 8. Partly cloudy, 12. Cloudy, 11.

April.—Cloudless days, 3. Partly cloudy, 10. Cloudy, 17.

May.—Cloudless days, 9. Partly cloudy, 9. Cloudy, 13.

June.—Cloudless days, 9. Partly cloudy, 16. Cloudy, 5.

July.—Cloudless days, 8. Partly cloudy, 16. Cloudy, 7.

August.—Cloudless days, 12. Partly cloudy, 12. Cloudy, 7.

September.—Cloudless days, 6. Partly cloudy, 15. Cloudy, 9.

October.—Cloudless days, 1. Partly cloudy, 13. Cloudy, 17.

November.—Cloudless days, 4. Partly cloudy, 9. Cloudy, 17.

December.—Partly cloudy, 11. Cloudy, 20.

### SAULT STE. MARIE.

January.—Cloudless days, 2. Partly cloudy, 3. Cloudy, 26.

February.—Cloudless days, 3. Partly cloudy, 8. Cloudy, 17.

March.—Cloudless days, 4. Partly cloudy, 12. Cloudy, 15.

April.—Cloudless days, 4. Partly cloudy, 4. Cloudy, 22.

May.—Cloudless days, 2. Partly cloudy, 11. Cloudy, 18.

June.—Cloudless days, 10. Partly cloudy, 6. Cloudy, 14.

July.—Cloudless days, 4. Partly cloudy, 12. Cloudy, 15.

August.—Cloudless days, 7. Partly cloudy, 10. Cloudy, 14.

September.—Cloudless days, 3. Partly cloudy, 10. Cloudy, 17.

October.—Cloudless days, 3. Partly cloudy, 10. Cloudy, 17.

November.—Partly cloudy days, 6. Cloudy, 24.

December.—Partly cloudy days, 4. Cloudy, 27.

### MANISTEE.

January.—Partly cloudy days, 3. Cloudy, 28.

February.—Cloudless days, 5. Partly cloudy, 6. Cloudy, 17.

March.—Cloudless days, 11. Partly cloudy, 4. Cloudy, 16.

April.—Cloudless days, 2. Partly cloudy, 11. Cloudy, 17.

May.—Cloudless days, 11. Partly cloudy, 11. Cloudy, 9.

June.—Cloudless days, 14. Partly cloudy, 12. Cloudy, 4.

July.—Cloudless days, 15. Partly cloudy, 10. Cloudy, 6.

August.—Cloudless days, 16. Partly cloudy, 9. Cloudy, 6.

### ALPENA.

January.—Cloudless days, 2. Partly cloudy, 5. Cloudy, 24.
February.—Cloudless days, 9. Partly cloudy, 8. Cloudy, 11.
March.—Cloudless days, 11. Partly cloudy, 14. Cloudy, 6.
April.—Cloudless days, 2. Partly cloudy, 12. Cloudy, 16.
May.—Cloudless days, 8. Partly cloudy, 12. Cloudy, 11.
July.—Cloudless days, 10. Partly cloudy, 17. Cloudy, 4.
August.—Cloudless days, 13. Partly cloudy, 13. Cloudy, 5.
October.—Cloudless days, 9. Partly cloudy, 13. Cloudy, 9.
November.—Cloudless days, 4. Partly cloudy, 7. Cloudy, 19.
December.—Cloudless days, 2. Partly cloudy, 10. Cloudy, 19.

### GRAND HAVEN.

January.—Partly cloudy days, 2. Cloudy, 29.
February.—Cloudless days, 2. Partly cloudy, 7. Cloudy, 19.
March.—Cloudless days, 6. Partly cloudy, 6. Cloudy, 19.
April.—Cloudless days, 3. Partly cloudy, 11. Cloudy, 16.
May.—Cloudless days, 8. Partly cloudy, 16. Cloudy, 7.
June —Cloudless days, 14. Partly cloudy, 12. Cloudy, 4.
July.—Cloudless days, 15. Partly cloudy, 13. Cloudy, 3.
August.—Cloudless days, 16. Partly cloudy, 13. Cloudy, 2.
September.—Cloudless days, 14. Partly cloudy, 9. Cloudy, 7.
October.—Cloudless days, 11. Partly cloudy, 10. Cloudy, 10.
November.—Cloudless days, 8. Partly cloudy, 6. Cloudy, 16.
December.—Cloudless days, 4. Partly cloudy, 2. Cloudy, 25.

### PORT HURON.

January.—Cloudless days, 9. Partly cloudy, 7. Cloudy, 15.
February.—Cloudless days, 6. Partly cloudy, 16. Cloudy, 6.
March.—Cloudless days, 11. Partly cloudy, 7. Cloudy, 13.
April.—Cloudless days, 4. Partly cloudy, 11. Cloudy, 15.
May.—Cloudless days, 10. Partly cloudy, 11. Cloudy, 10.
June.—Cloudless days, 20. Partly cloudy, 5. Cloudy, 5.
July.—Cloudless days, 16. Partly cloudy, 12. Cloudy, 3.
August.—Cloudless days, 19. Partly cloudy, 9. Cloudy, 3.
September.—Cloudless days, 11. Partly cloudy, 11. Cloudy, 8.
October.—Cloudless days, 15. Partly cloudy, 6. Cloudy, 10.
November.—Cloudless days, 6. Partly cloudy, 8. Cloudy, 16.
December.—Cloudless days, 2. Partly cloudy, 11. Cloudy, 18.

### DETROIT.

January.—Cloudless days, 3. Partly cloudy, 8. Cloudy, 20.
February.—Cloudless days, 8. Partly cloudy, 8. Cloudy, 12.
March.—Cloudless days, 11. Partly cloudy, 9. Cloudy, 11.
April.—Cloudless days, 5. Partly cloudy, 9. Cloudy, 16.
May.—Cloudless days, 10. Partly cloudy, 11. Cloudy, 10.
June.—Cloudless days, 13. Partly cloudy, 13. Cloudy, 4.
July.—Cloudless days, 16. Partly cloudy, 11. Cloudy, 4.
August.—Cloudless days, 15. Partly cloudy, 10. Cloudy, 6.
September.—Cloudless days, 11. Partly cloudy, 11. Cloudy, 8.
October.—Cloudless days, 14. Partly cloudy, 6. Cloudy, 11.
November.—Cloudless days, 9. Partly cloudy, 7. Cloudy, 14.
December.—Cloudless days, 3. Partly cloudy, 9. Cloudy, 19.

### KALAMAZOO.

In the following statement relative to Kalamazoo, are named for the months January, August, September, November and December, the days of the month "sunny," "fair," and "cloudy" (the *per cent* of cloudiness having been recorded for each day), the days are named sunny when the sky was three-tenths or less than three-tenths covered with clouds; fair, when the sky was from four-tenths to seven-tenths (inclusive) covered; cloudy, when the sky was more than seven-tenths covered,—as observed by Wm. M. Edwards, M. D., Kalamazoo.

JANUARY.—Sunny, 19. Fair, 7, 12, 17, 29—4 days. Cloudy, 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31—26 days.

AUGUST.—Sunny, 3, 5, 6, 7, 8, 9, 10, 12, 14, 15, 30, 31—12 days. Fair, 1, 2, 4, 11, 13, 17, 18, 19, 20, 21, 29—11 days. Cloudy, 16, 24, 27. 28.

SEPTEMBER.—Sunny, 3, 4, 6, 7, 8, 11, 17, 19, 23, 28—10 days. Fair, 1, 2, 5, 9, 10, 14, 15, 16, 20, 22, 26, 27—12 days. Cloudy, 12. 13, 18, 21, 24, 25, 29, 30—8 days.

NOVEMBER.—Sunny, 4, 5, 6, 7, 9, 16—6 days. Fair, 1, 3, 8, 10, 13, 17, 19, 20, 26—9 days. Cloudy, 2, 11, 12, 14, 15, 18, 21, 22, 23, 24, 25, 27, 28, 29, 30—15 days.

DECEMBER.—Sunny, 20, 21. Fair, 3, 4, 8, 13, 23, 26—6 days. Cloudy, 1, 2, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 22, 24, 25, 27, 28, 29, 30, 31—23 days.

# THE TIME OF GREATEST PREVALENCE OF EACH DISEASE.

## CONTRIBUTIONS TO THE STUDY OF THE CAUSES OF SICKNESS.

### A STATISTICAL REPORT BASED ON WEEKLY REPORTS OF SICKNESS IN MICHIGAN DURING THE YEAR 1893, AND PRECEDING YEARS.

BY THE SECRETARY OF THE STATE BOARD OF HEALTH.

This paper is the seventeenth in a series of articles upon the same general subject begun in the latter part of 1876. It presents a summary of the compilation of weekly reports of sickness in Michigan in 1893. It includes a series of diagrams or graphic illustrations which show by months in 1893, the rise and fall of twenty-eight of the most prominent diseases in Michigan.

Propositions are stated as to the relations of specified meteorological conditions, and diseases are mentioned under these propositions in such manner as to suggest one method of studying some of the facts brought out in the compilation.

Tables are given showing the per cent of the weekly *reports* which stated the presence of the various diseases, first (in Exhibit IV.), for each of the years 1881–1893, and an average for 1877–1892, also for the seven years, 1886–1892; and secondly (in Exhibit IV., continued), by months, in each of the years 1892, 1893, and the average for the period of sixteen years, 1877–1892, also for the period of seven years, 1886–1892, the diseases being arranged in the order of their greatest reported prevalence in 1893, to facilitate a comparison with the prevalence of the same diseases in previous years, and in corresponding months in previous years.

The per cent of *observers* stating the presence of each of the diseases is given in Table 1, for the year 1893, and, for comparison, for each of the years 1881–1893, and, in Table 1, continued, for the months in the year 1893, and, for comparison, by months in the years 1892–1893, and the average by months for the period 1877–1892, also for the period of seven years, 1886–1892.

Comparing Table 1, with exhibit IV., we see the correspondence in the two lines of evidence,—that of the "prevalence" of the diseases as shown by the per cent of *reports*, and the "area of prevalence" as shown by the per cent of *observers*, the diseases following each other in a somewhat similar order from highest to lowest—the diseases being arranged in the table, as in the exhibit, in the order of their greatest reported prevalence in 1893.

One of the objects of this compilation is to learn the time of the greatest and of the least prevalence of the more important diseases in the State, and to note the connection of this prevalence with each of the meteorological conditions in the State. Casual observation shows that certain diseases are much more prevalent in the hot months, while certain other diseases are much more prevalent in the cold months. The relation between these diseases and the atmospheric temperature is well marked, but accurate statistics are needed to show just what that relation is. We find, also, that other meteorological conditions than atmospheric temperature have a marked effect upon many of the diseases, apparently diminishing the effect of temperature in some instances, increasing its effect in other instances. For these reasons the State Board of Health undertakes, by a compilation of the weekly reports of sickness in connection with the various meteorological conditions, to learn what causal relations exist between the humidity of the air, the ozone, the velocity of the wind, the atmospheric pressure, etc., and the increased or diminished prevalence of diseases in certain months as compared with other months in the same year, or with the same months in other years or series of years.

Since 1876, when this system of "weekly reports of sickness" was begun, an important work has been accomplished in learning the time of the greatest prevalence of each of several of the most important diseases, and consequently the time of greatest danger from each such disease, in the State considered as a unit. To facilitate the study of the causes of sickness and deaths, the State is divided into eleven geographical divisions, a list of which, and the counties embraced in each, appear in Exhibit I., page 87. From some of these divisions sufficient data are not yet received to make the study of the comparative prevalence of diseases in different parts of the State practicable. The number of reports from localities in the newer parts of the State is increasing, however, and a comparison of sickness by localities may become practicable in the near future.

### PHYSICIANS' WEEKLY REPORTS OF SICKNESS.

Weekly reports are now received concerning twenty-eight diseases, the names of which are printed on the blank postal used for the weekly report, and concerning these twenty-eight diseases a positive report is made each week by each of many of the leading physicians in Michigan.

Great credit is due the busy medical practitioners in Michigan who forward these reports of sickness. Some of them have made the reports regularly since this plan was adopted in 1876. The service is, as a rule, without compensation; a few health officers have slight pay from their local boards of health. Each one should have full compensation. No other class of persons has knowledge of the facts that are necessary in the compilation of health statistics; and it is greatly to the credit of physicians that they are so willing to coöperate in every effort made to advance the public health.

### PLAN OF THE WEEKLY CARD-REPORTS.

The plan of the weekly reports remains the same as last year. (Cards having *Pleuritis* printed on them were first used for weekly reports in October, 1887.) Observers now report only the diseases under their own personal observation. Previous to the year 1885, some of the observers reported such diseases as they believed to be present in their locality, even though not under their own observation. The change in method of making the reports may account partially for the apparent decrease in sickness in 1893, when compared with the average for the sixteen years, 1877–92. Details of the method of securing and the plan of marking these reports may be thus stated:—

The blanks for the weekly reports are printed on postal cards, which are supplied to the observers of diseases. Blank record books in which to preserve copies of the reports, remarks, etc., are also supplied to these observers, to be retained by them. The reports are forwarded weekly to the Secretary of the State Board of Health at Lansing.

The plan of making the report is as follows: Each observer is requested to mark the disease of which there was the greatest number of cases under his observation during the week for which the report is made, 1; that of which there was the next greatest number of cases, 2; the next, 3; and so on, applying *consecutive* numbers to the diseases reported present; but marking with the *same* figure all diseases of which there is the same number of cases; to write 0 opposite each disease mentioned of which there was no case; to apply these numbers without regard to the severity of the cases; to include all cases, without regard to when they were taken sick, so long as they are actually sick with the given disease; to include all cases "under the observation" of the observer. A blank is left on the card for the convenience of those observers who prefer to state the number of cases rather than the order of prevalence by the foregoing method.

To illustrate the method of making the reports, the following copy of one of the blanks now in use is given, correctly marked, in the "prevalence" column, for the number of cases stated on the right-hand margin. It should be remembered that the numbers in the "prevalence" column denote simply the relative order in which the several diseases appear to be prevalent, and do not denote a definite number of cases; so that a disease might one week be marked *4*, and the following week, with the same number of cases, be marked *1*. Names of diseases and figures printed in italics are not *printed* on the postal blanks, but are supposed to have been *written* on the report by the observer.

*Diseases in*..........................................and vicinity.
☞PLEASE DATE. ☜
*week ending Sat.*,.........................................., *189*....

REMARKS:—

........ ........

**ED. 37.**

a. Please mark the disease of which there is the greatest number of cases, 1; the disease having next greatest number of cases, 2; the next, 3; and so on for each disease, writing the same figures opposite diseases having the same number of cases. Write 0 opposite each disease of which there is no case under your observation. [For full statement of plan, see second, third, and fourth pages of record-book cover.] A blank indicates that the item has been overlooked.

If this report includes a contagious disease, please mention, on the bottom or margin of this card, the township, city, or village in which the disease is.

Please mail this, ☞ signed and dated, ☜ as soon as convenient after close of week specified.

DISEASES, CASES OBSERVED.

| | Preval'nce Order. See a | No. of Cases. |
|---|---|---|
| Brain, Inflammation of | *14* | *1* |
| Bowels, Inflammation of | *12* | *3* |
| Bronchitis | *11* | *4* |
| Cerebro-spinal Meningitis | *0* | *0* |
| Cholera Infantum | *8* | *9* |
| Cholera Morbus | *10* | *6* |
| Consumption, Pulmonary | *10* | *6* |
| Croup, Membranous | *12* | *3* |
| Diphtheria | *5* | *14* |
| Diarrhea | *3* | *17* |
| Dysentery | *8* | *9* |
| Erysipelas | *13* | *2* |
| Fever, Intermittent | *2* | *21* |
| Fever, Remittent | *11* | *4* |
| Fever, Typhoid (Enteric) | *0* | *0* |
| Fever, Typho-malarial | *9* | *7* |
| Influenza | *7* | *11* |
| Kidney, Inflammation of | *14* | *1* |
| Measles | *1* | *27* |
| Neuralgia | *14* | *1* |
| Pleuritis | *0* | *0* |
| Pneumonia | *9* | *7* |
| Puerperal Fever | *0* | *0* |
| Rheumatism | *6* | *12* |
| Scarlatina | *4* | *16* |
| Small-pox | *0* | *0* |
| Tonsillitis | *11* | *4* |
| Whooping-cough | *0* | *0* |
| *Mumps* | *6* | *12* |
| *Dyspepsia* | *11* | *4* |

.......................................................... *M. D.*

## BULLETINS OF HEALTH IN MICHIGAN.

During the year 1893 the issue of weekly and monthly bulletins of "Health in Michigan" has been continued. The weekly bulletin is compiled from the physicians' weekly reports from all parts of the State. It is designed to give, each week, information to the public concerning the diseases which cause most sickness in the State, the relative amount of sickness compared with the preceding week—thus showing any sudden increase or decrease which may have occurred in the prevalence of any disease, together with a similar comparison of the various meteorological conditions; also, a list of the localities in which each of the dangerous communicable diseases is reported present. If the newspapers would publish the localities where dangerous diseases are, the information would be valuable to parents who might thus be enabled to avoid taking their children to such places until after the disease had ceased and thorough disinfection had occurred. A copy of this bulletin has been sent to such editors as have expressed a desire to have it for use, entire or in part, in their papers. About fifty-five copies are now used for this purpose each week. An abstract of it also goes to the Michigan Associated Press. The monthly bulletin is similar in character to the weekly bulletin, and shows the relative amount of sickness compared with the average for corresponding months in previous years, and compared with the preceding month, together with a similar comparison of the various meteorological conditions. It is issued as soon as possible after the close of each month, and is sent to the sanitary and medical journals which are received as exchanges by the library of the State Board of Health. About one hundred copies are thus used at the present time.

As a rule, about five-eighths of the card reports reach the office of the State Board of Health in time for compilation in the weekly bulletin, and the monthly bulletins are compiled from the information used in the weekly bulletins. It is found that the statements made in the monthly bulletins are corroborated by the information obtained after the close of the year, in the compilation of the whole number of the reports for the corresponding months of the year.

## COMPILATION OF THE WEEKLY REPORTS.

The reports from each locality are compiled by months. The average of the numbers stating the order of prevalence of the several diseases for the month is considered an indication of the actual order of prevalence of the diseases for that time. There is also found for each locality what per cent of the reports state the presence of each disease for the given month. This per cent of reports for a single locality indicates what part of the month the disease was present in that locality. It may also be called the per cent of weeks the disease was present. These first results of the compilation are stated in Table 3, which, on account of the space required, has not been printed in the reports since that of 1882, but is preserved in the office of the State Board for reference and study.

A combination of the statements for localities in Table 3, is made by months for the State, so far as it is represented by the localities from which reports are received, showing: (1) What per cent of the observers reported each disease each month; (2) for the localities at which a given diseases was reported, an average of the per cent of weeks it was reported at those localities; (3) what per cent of all the reports received for the month stated the presence of each disease; (4) an average of the numbers denoting the order of prevalence of each disease at the localities at which it was reported present during the month.

### THE PREVALENCE OF THE SEVERAL DISEASES IN 1893.

By noting the per cent of all the reports received for a given time which stated the presence of each disease, the relative prevalence of the several diseases may be readily seen. This per cent has been computed for each disease, by months, for the year 1893. It is thus stated in Exhibit II., page 88, which also states the per cent for each disease for the year 1893, and an average for the period of sixteen years, 1877–92, also for the period of seven years, 1886–92. What per cent of the reports stated the presence of each disease by months in 1893, is graphically represented in Diagrams 1–5 on page 89 and following pages.

For twenty diseases a comparison has been made of the amount of sickness in 1893 (as indicated by the proportion of reports stating the presence of the disease) with the average amount for a period of sixteen years, also for a recent period of seven years. These comparisons are shown in Exhibits XI., XIII., XVIII., and XX. A comparison is made in Table 1, on pages 97, 98 and 99 between the per cent of observers reporting the tabulated diseases present in each of the years 1881–1893, and by months in two of those years; also an average by months for the period of sixteen years 1877–92, also for the period of seven years, 1886–1892. In Exhibit IV., on pages 91, 92 and 93, the per cents of reports stating the presence of each of the twenty-eight tabulated diseases, for each of the years 1881–93, and an average by months for the years 1892 and 1893, and for the period of sixteen years, 1877–92, also for the period of seven years, 1886–1892, is given. In Table 1, and in Exhibit IV., the diseases are arranged in the order of the greatest per cents fcr 1893, the highest being placed first.

A study of the reported sickness from twenty-eight diseases, in connection with meteorological conditions by months in 1893, is made in Exhibit X., and following exhibits. By arranging months in order of greatest prevalence of the disease under consideration, noting whether it is more or less prevalent than the average for the year, and noting what were the meteorological conditions for the same months as compared with the average for the year, relations and comparisons are grouped for convenient comparison. A summary of one line of the evidence presented by these exhibits is given in Exhibits XXV. and XXVI.

In Exhibits VI. and VII., on subsequent pages, the leading diseases are arranged in order according to the amount of sickness reported from them in 1893, those from which there was most sickness reported being placed first. In these exhibits the diseases are arranged with reference to the per cent of reports taken in connection with the average order of prevalence.

The comparison with former years is facilitated by reference to Exhibit II., page 88, Table 1, pages 97, 98 and 99, Exhibit IV., pages 91, 92 and 93, and Exhibits XI., XIII., XVIII., and XX.

Exhibit IV., on pages 91, 92 and 93, is continued for 1893. In it the diseases are arranged in order of the greatest per cent of reports stating the presence of the diseases in 1893, the highest per cent being placed first in the line. It is similar in form to Table 1, page 97, which shows the per cent of observers by whom diseases were reported present. It affords a means of comparing the diseases showing greatest prevalence with those showing greatest area of prevalence or widest distribution. It affords also a means for the comparison of per cent of reports in 1893, with the average per cent of reports in the sixteen years, 1877–1892, also in the seven years, 1886–1892, both for the year and by months, also by months in 1893 with the year 1892.

### DISEASES FROM WHICH THERE WAS A MARKED INCREASE OR DECREASE IN PREVALENCE IN MICHIGAN IN 1893.

By referring to Exhibits II. and IV. it will be seen that there was no disease which showed a marked increase in 1893 over the average for the sixteen years, 1877–1892. The diseases in which the decrease in 1893 appears most marked are typho-malarial fever, intermittent fever, diphtheria, remittent fever, whooping-cough, measles, erysipelas, consumption, pneumonia, scarlet fever, dysentery and pleuritis.

A part of the lessened prevalence of some of the prominent diseases may be due to the change in the method of reporting sickness, referred to in the last paragraph on page 82.

A comparison of 1893 with the average for the seven years, 1886–1892, shows that there was no disease in which there was a marked increase in 1893; and that typho-malarial fever, intermittent fever, remittent fever, erysipelas and whooping-cough are the only diseases in which there was a marked decrease in 1893.

### *Change in Method of Comparison of Diseases by Years.*

In former Reports, ending with the Report for 1888, mention has been made of diseases in which a difference of seven or more was shown between the per cents of reports stating the presence of the disease in the current year and in the preceding year or term of years; in the last five preceding Reports those diseases were mentioned of which the comparison showed an increase or decrease of twenty-five per cent from the preceding year, or from the normal, as the case may be.

In this report, those diseases which are reported by seven or more observers, and which show an increase or decrease of twenty-five per cent are generally mentioned, except in cases of cholera, small-pox, typhus fever or other particularly interesting or dangerous disease, and these are specially considered in each instance.

This rule was also adopted for the weekly and monthly bulletins, "Health in Michigan," beginning with February, 1893.

In exhibits XI., XIII., XVIII., and XX., the per cent of reports by months in 1893 is placed directly under the per cents for the corresponding months in 1892. A comparison between the corresponding months in the two years is thus made possible, and the comparison of the months in 1893 with the averages for the months in the series of years preceding is made possible by placing the differences, greater or less, in separate lines.

EXHIBIT I.—*Eleven Geographical Divisions of the State, formed for the purpose of facilitating the Study of Causes of Sickness and of Deaths, with a list of Counties included in each Division.*

| 1.—Upper Peninsula. | 2.—Northwestern. | 3.—Northern. | 4.—Northeastern. | 5.—Western. | 6.—Northern-central. | 7.—Bay and Eastern. | 8.—Central. | 9.—Southwestern. | 10.—Southern-central. | 11.—Southeastern. |
|---|---|---|---|---|---|---|---|---|---|---|
| Alger. | Benzie. | Antrim. | Alcona. | Kent. | Clare. | Arenac. | Barry. | Allegan. | Branch. | Macomb. |
| Baraga. | Gr. Traverse. | Charlevoix. | Alpena. | Lake. | Gladwin. | Bay. | Clinton. | Berrien. | Calhoun. | Monroe. |
| Chippewa. | Leelanaw. | Cheboygan. | Iosco. | Mason. | Isabella. | Huron. | Eaton. | Cass. | Hillsdale. | Oakland. |
| Delta. | Manistee. | Crawford. | Montmorency. | Muskegon. | Mecosta. | Lapeer. | Genesee. | Van Buren. | Jackson. | Wayne. |
| Dickinson. | Manitou. | Emmet. | Ogemaw. | Newaygo. | Midland. | Saginaw. | Gratiot. | | Kalamazoo. | |
| Gogebic. | Wexford. | Kalkaska. | Oscoda. | Oceana. | Roscommon. | Sanilac. | Ingham. | | Lenawee. | |
| Houghton. | | Otsego. | Presque Isle. | Ottawa. | Missaukee. | St. Clair. | Ionia. | | St. Joseph. | |
| Iron. | | | | | Osceola. | Tuscola. | Livingston. | | Washtenaw. | |
| Isle Royal. | | | | | | | Montcalm. | | | |
| Keweenaw. | | | | | | | Shiawassee. | | | |
| Luce. | | | | | | | | | | |
| Mackinac. | | | | | | | | | | |
| Marquette. | | | | | | | | | | |
| Menominee. | | | | | | | | | | |
| Ontonagon. | | | | | | | | | | |
| Schoolcraft. | | | | | | | | | | |

On pages 230 and 253 of the Report of this Board for 1885, the divisions and the counties in each were indicated by lines on maps of the State.

EXHIBIT II.—*Stating for each of 28 Diseases for the Year ending Saturday, December 30, 1893, by Months of the Year 1893, the average for the period of sixteen years, 1877–92, and the average for the period of seven years, 1886–92, on what per Cent of the reports received each Disease was stated to be present.—Compiled from weekly reports by Health Officers of Cities and Villages, by regular Correspondents of the State Board of Health, and by other Physicians.**

| Diseases. | Average, 1877-92. | Average, 1886-92. | What Per Cent of the Reports received stated the Presence of the Disease. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Year, 1893. | Months, 1893. | | | | | | | | | | | |
| | | | | Jan. | Feb. | Mar. | Apr. | May. | June | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Average † | 28 | 24 | 20 | 21 | 21 | 20 | 20 | 19 | 18 | 18 | 21 | 21 | 20 | 20 | 20 |
| Brain, inflammation of | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 4 | 2 | 2 |
| Bowels, inflammation of | 15 | 15 | 12 | 8 | 8 | 11 | 11 | 8 | 13 | 13 | 20 | 16 | 14 | 10 | 9 |
| Bronchitis | 60 | 58 | 53 | 67 | 67 | 62 | 64 | 54 | 42 | 35 | 34 | 39 | 48 | 61 | 62 |
| Cerebro-spinal meningitis | 4 | 3 | 2 | 4 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 |
| Cholera infantum | 13 | 12 | 10 | 2 | 1 | 1 | 1 | 1 | 9 | 17 | 34 | 33 | 15 | 2 | 1 |
| Cholera morbus | 17 | 16 | 14 | 4 | 4 | 5 | 4 | 4 | 13 | 24 | 43 | 38 | 13 | 5 | 3 |
| Consumption, pulmonary | 58 | 49 | 38 | 35 | 38 | 43 | 45 | 43 | 37 | 35 | 37 | 37 | 32 | 37 | 38 |
| Croup, membranous | 5 | 4 | 2 | 2 | 5 | 4 | 2 | 2 | 0.2 | 1 | 1 | .02 | 1 | 3 | 2 |
| Diphtheria | 16 | 8 | 7 | 10 | 9 | 6 | 6 | 8 | 9 | 7 | 8 | 6 | 6 | 8 | 6 |
| Diarrhea | 46 | 45 | 40 | 28 | 25 | 25 | 29 | 28 | 36 | 54 | 74 | 75 | 55 | 29 | 24 |
| Dysentery | 18 | 17 | 13 | 7 | 5 | 7 | 4 | 4 | 9 | 13 | 34 | 41 | 25 | 9 | 2 |
| Erysipelas | 23 | 21 | 14 | 14 | 18 | 15 | 18 | 17 | 14 | 15 | 8 | 9 | 11 | 12 | 15 |
| Fever, intermittent | 60 | 42 | 24 | 19 | 14 | 18 | 25 | 26 | 25 | 27 | 32 | 29 | 28 | 26 | 17 |
| Fever, remittent | 41 | 29 | 18 | 13 | 13 | 14 | 14 | 19 | 21 | 20 | 22 | 25 | 24 | 21 | 12 |
| Fever, typhoid (enteric) | 11 | 9 | 9 | 6 | 4 | 3 | 3 | 4 | 6 | 7 | 12 | 16 | 23 | 20 | 8 |
| Fever, typho-malarial | 18 | 12 | 4 | 5 | 2 | 2 | 3 | 2 | 1 | 2 | 7 | 9 | 8 | 8 | 4 |
| Influenza | 40 | 40 | 43 | 56 | 58 | 57 | 48 | 40 | 21 | 14 | 16 | 25 | 29 | 62 | 93 |
| Kidney, inflammation of | 21 | 20 | 17 | 19 | 18 | 20 | 22 | 21 | 19 | 17 | 13 | 14 | 14 | 15 | 12 |
| Measles | 12 | 10 | 7 | 10 | 12 | 10 | 11 | 17 | 13 | 8 | 3 | 2 | 1 | 2 | 2 |
| Neuralgia | 65 | 65 | 57 | 57 | 62 | 65 | 61 | 56 | 50 | 51 | 53 | 54 | 55 | 60 | 57 |
| Pleuritis | 19 | 13 | 14 | 21 | 20 | 21 | 17 | 13 | 11 | 11 | 7 | 9 | 10 | 12 | 22 |
| Pneumonia | 33 | 28 | 22 | 34 | 36 | 34 | 31 | 20 | 12 | 8 | 7 | 9 | 12 | 24 | 34 |
| Puerperal fever | 5 | 4 | 3 | 5 | 4 | 3 | 5 | 4 | 5 | 4 | 3 | 3 | 2 | 3 | 1 |
| Rheumatism | 68 | 68 | 64 | 66 | 67 | 68 | 73 | 67 | 61 | 60 | 58 | 57 | 64 | 64 | 65 |
| Scarlatina | 15 | 10 | 10 | 16 | 12 | 10 | 12 | 11 | 11 | 7 | 7 | 7 | 10 | 11 | 12 |
| Small-pox | 0.7 | 0.1 | 0.3 | 1 | 2 | 0.2 | 0.2 | 0 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tonsillitis | 48 | 47 | 49 | 62 | 59 | 61 | 54 | 49 | 37 | 37 | 34 | 35 | 44 | 53 | 55 |
| Whooping-cough | 17 | 12 | 9 | 7 | 9 | 7 | 7 | 10 | 12 | 11 | 13 | 9 | 7 | 7 | 8 |
| No. of reports received | 4447 | 5005 | 5853 | 483 | 480 | 536 | 406 | 529 | 442 | 465 | 568 | 458 | 459 | 576 | 451 |

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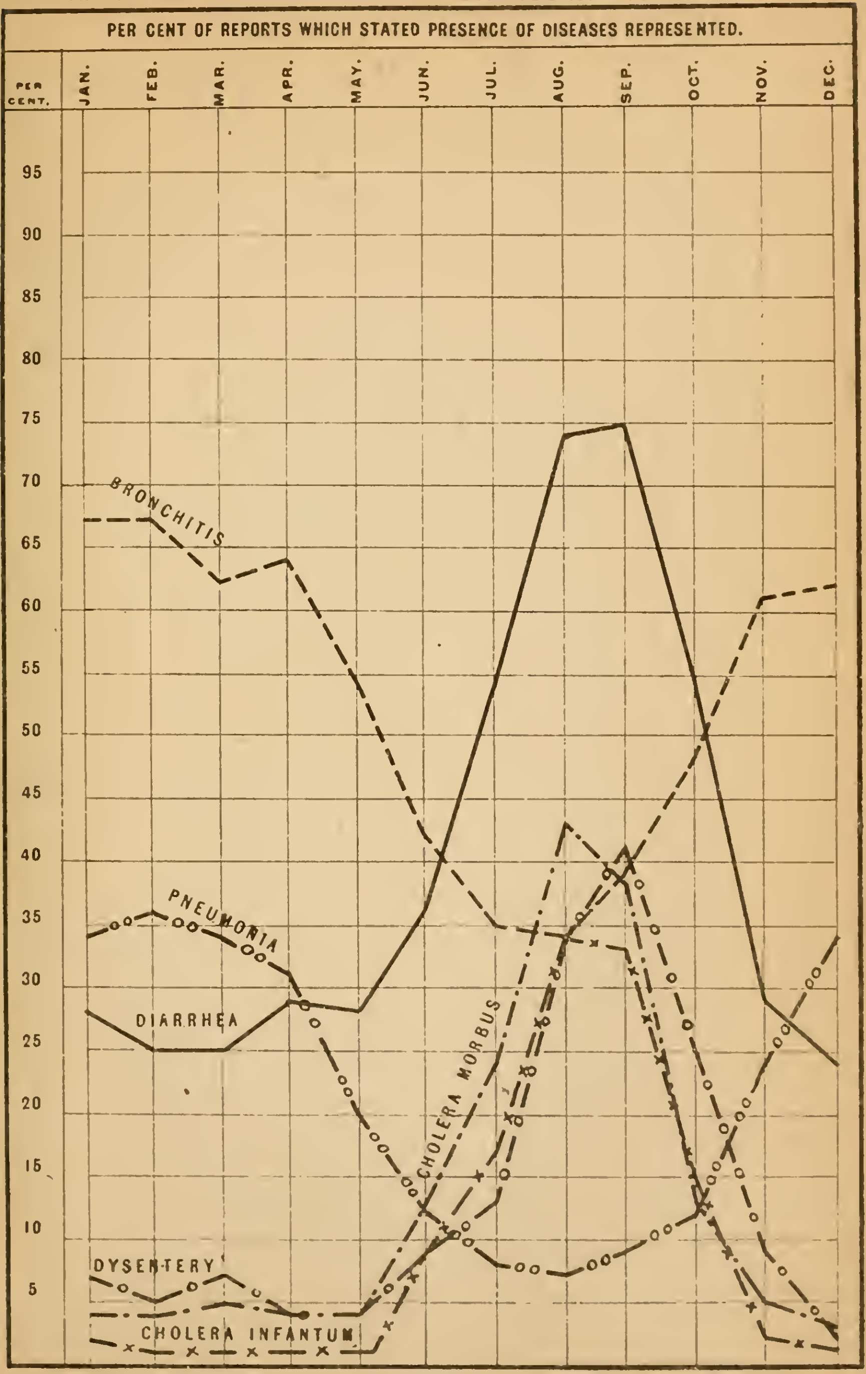
* For 1893 the names of observers are stated in Exhibit V., pages 94, 95 and 96.

† This line is an average for such of the tabulated diseases as were reported present in the given month or year.

Statements in this exhibit for months in 1893 are graphically represented in Diagrams 1, 2, 3, 4, 5, opposite this page, and on following pages.

DIAGRAM I—WEEKLY REPORTS OF SICKNESS IN MICHIGAN IN 1893.



[Plate 758.]

EXHIBIT III.—*Stating, by Months of the year ending Saturday, December 30, 1893, for the State, and for each of the Eleven Geographical Divisions of Michigan from which Weekly Reports of Diseases were received, the number of Observers from whom the Reports were received; the Number of Reports Received; the day on which, for the purposes of this compilation, each month is made to end; and the number of Weeks thus included in each Month.*

| Months, 1893. | Months and Year end Saturday. | Number of weeks. | State. | | Divisions of the State.* | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1. Upper Peninsula.* | | 2. North-western.* | | 3. Northern.* | | 4. North-eastern.* | | 5. Western.* | | 6. Northern Central.* | | 7. Bay and Eastern.* | | 8. Central.* | | 9. South-western.* | | 10. Southern Central.* | | 11. South-eastern.* | |
| | | | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† | Observers.‡ | Reports.† |
| Year, 1893‡ | Dec. 30, 1893 | 52 | 205 | 5,853 | 18 | 429 | 5 | 130 | 9 | 197 | 4 | 128 | 16 | 448 | 6 | 138 | 25 | 788 | 43 | 1,073 | 24 | 778 | 41 | 1,317 | 14 | 427 |
| Av. per month | | | 121 | 488 | 9 | 36 | 3 | 11 | 4 | 16 | 3 | 11 | 9 | 37 | 3 | 12 | 16 | 66 | 23 | 89 | 16 | 65 | 27 | 110 | 9 | 36 |
| January | January 28 | 4 | 126 | 483 | 11 | 41 | 3 | 11 | 6 | 22 | 3 | 12 | 10 | 39 | 4 | 16 | 13 | 49 | 23 | 89 | 13 | 50 | 31 | 118 | 9 | 36 |
| February | February 25 | 4 | 124 | 480 | 10 | 38 | 3 | 11 | 6 | 24 | 3 | 12 | 11 | 43 | 4 | 16 | 14 | 54 | 23 | 86 | 12 | 46 | 29 | 114 | 9 | 36 |
| March | April 1 | 5 | 115 | 536 | 8 | 37 | 3 | 15 | 3 | 11 | 3 | 15 | 10 | 47 | 4 | 18 | 14 | 67 | 20 | 91 | 13 | 62 | 28 | 131 | 9 | 42 |
| April | April 29 | 4 | 114 | 406 | 7 | 23 | 4 | 14 | 2 | 7 | 2 | 8 | 10 | 37 | 4 | 15 | 16 | 56 | 19 | 65 | 18 | 63 | 24 | 90 | 8 | 28 |
| May | June 3 | 5 | 115 | 529 | 7 | 32 | 4 | 18 | 3 | 12 | 2 | 10 | 9 | 38 | 3 | 14 | 15 | 72 | 20 | 92 | 19 | 89 | 25 | 113 | 8 | 39 |
| June | July 1 | 4 | 123 | 442 | 9 | 29 | 5 | 17 | 4 | 15 | 3 | 10 | 8 | 28 | 3 | 11 | 16 | 60 | 23 | 80 | 18 | 68 | 25 | 90 | 9 | 34 |
| July | July 29 | 4 | 126 | 465 | 11 | 35 | 4 | 13 | 5 | 18 | 3 | 12 | 9 | 35 | 2 | 7 | 16 | 60 | 24 | 87 | 19 | 71 | 25 | 97 | 8 | 30 |
| August | September 2 | 5 | 121 | 568 | 9 | 41 | 3 | 11 | 4 | 20 | 3 | 15 | 9 | 43 | 2 | 8 | 18 | 87 | 21 | 96 | 17 | 80 | 27 | 129 | 8 | 38 |
| September | September 30 | 4 | 125 | 458 | 10 | 32 | 1 | 4 | 4 | 16 | 2 | 8 | 9 | 33 | 2 | 7 | 18 | 69 | 26 | 90 | 17 | 59 | 27 | 105 | 9 | 35 |
| October | October 28 | 4 | 123 | 459 | 10 | 33 | 2 | 8 | 4 | 15 | 2 | 8 | 9 | 33 | 2 | 8 | 18 | 67 | 25 | 91 | 15 | 58 | 27 | 104 | 9 | 34 |
| November | December 2 | 5 | 122 | 576 | 10 | 47 | 1 | 5 | 5 | 20 | 2 | 10 | 9 | 42 | 2 | 10 | 18 | 82 | 25 | 116 | 15 | 74 | 26 | 127 | 9 | 43 |
| December | December 30 | 4 | 121 | 451 | 11 | 41 | 1 | 3 | 5 | 17 | 2 | 8 | 9 | 30 | 2 | 8 | 18 | 65 | 24 | 90 | 15 | 58 | 26 | 99 | 8 | 32 |

* The counties in each division are given in Exhibit I., page 87. † From some of the observers reports were not received every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks in the given month or in the year.

‡ In some localities there were more observers than one. The whole number of localities from which reports were received was 172; the average number per month was 109. The names of observers and number of cards received from each observer for each month and for the year are stated in Exhibit V., pages 94, 95, 96.

EXHIBIT IV.—*Stating for each of 28 Diseases, the average for the period of sixteen years, 1877–1892, and for each of the last twelve of those years and 1893, and for the period of seven years, 1886–1892, on what Per Cent of the Reports received the Diseases were stated to be present. Compiled from Weekly Reports by Health Officers of Cities and Villages and by regular correspondents of the State Board of Health.* Continued for each month of 1892 and 1893 on pages 92 and 93.*

| Line number. | Diseases. | What Per Cent of the Reports stated the Presence of the Disease. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Av. 1877–92. | Av. 1886–92. | 1893. | 1892. | 1891. | 1890. | 1889. | 1888. | 1887. | 1886. | 1885. | 1884. | 1883. | 1882. | 1881. |
| | Average disease † | ...... | ...... | 20 | 21 | 25 | 25 | 23 | 24 | 25 | 26 | 26 | 29 | 30 | 30 | 33 |
| 1 | Rheumatism | 68 | 68 | 64 | 64 | 69 | 71 | 65 | 66 | 69 | 70 | 68 | 70 | 68 | 68 | 71 |
| 2 | Neuralgia ‡ | 65 | 65 | 57 | 61 | 66 | 67 | 63 | 62 | 67 | 67 | 68 | 70 | 69 | 68 | 65 |
| 3 | Bronchitis | 60 | 58 | 53 | 54 | 60 | 65 | 58 | 59 | 55 | 56 | 56 | 61 | 66 | 65 | 62 |
| 4 | Tonsillitis ‡ | 48 | 47 | 49 | 48 | 49 | 50 | 46 | 41 | 47 | 49 | 50 | 50 | 50 | 48 | 48 |
| 5 | Influenza | 40 | 40 | 43 | 42 | 55 | 53 | 32 | 32 | 33 | 35 | 34 | 41 | 43 | 40 | 35 |
| 6 | Diarrhea | 46 | 45 | 40 | 43 | 47 | 44 | 45 | 41 | 48 | 45 | 46 | 52 | 49 | 48 | 52 |
| 7 | Consumption, pul. ‡ | 58 | 49 | 38 | 38 | 49 | 52 | 48 | 49 | 51 | 55 | 58 | 63 | 61 | 66 | 71 |
| 8 | Intermittent fever | 60 | 42 | 24 | 27 | 36 | 41 | 43 | 45 | 48 | 54 | 59 | 65 | 69 | 71 | 82 |
| 9 | Pneumonia | 33 | 28 | 22 | 25 | 27 | 30 | 26 | 30 | 28 | 27 | 27 | 29 | 38 | 39 | 41 |
| 10 | Remittent fever | 41 | 29 | 18 | 21 | 28 | 27 | 30 | 34 | 32 | 34 | 36 | 44 | 41 | 48 | 54 |
| 11 | Inflam. of kidney ‡ | 21 | 20 | 17 | 21 | 20 | 21 | 20 | 19 | 18 | 20 | 21 | 26 | ----- | ----- | ----- |
| 12 | Pleuritis ‡ | 19 | 13 | 14 | 18 | 21 | 19 | 17 | 18 | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 13 | Erysipelas | 23 | 21 | 14 | 16 | 19 | 21 | 22 | 24 | 24 | 23 | 24 | 26 | 25 | 22 | 23 |
| 14 | Cholera morbus | 17 | 16 | 14 | 15 | 16 | 15 | 14 | 15 | 19 | 17 | 17 | 22 | 18 | 17 | 26 |
| 15 | Dysentery | 18 | 17 | 13 | 15 | 16 | 16 | 17 | 17 | 19 | 17 | 15 | 23 | 21 | 17 | 23 |
| 16 | Inflam. of bowels ‡ | 15 | 15 | 12 | 13 | 15 | 14 | 14 | 14 | 16 | 17 | 17 | 17 | 16 | 13 | 14 |
| 17 | Scarlet fever | 15 | 10 | 10 | 12 | 9 | 10 | 10 | 9 | 8 | 11 | 12 | 16 | 19 | 18 | 19 |
| 18 | Cholera infantum | 13 | 12 | 10 | 11 | 13 | 10 | 11 | 11 | 13 | 14 | 17 | 15 | 14 | 12 | 18 |
| 19 | Typhoid fever (ent.) | 11 | 9 | 9 | 9 | 11 | 8 | 10 | 10 | 10 | 8 | 8 | 12 | 11 | 14 | 18 |
| 20 | Whooping-cough | 17 | 12 | 9 | 10 | 9 | 9 | 16 | 9 | 14 | 20 | 14 | 23 | 15 | 17 | 16 |
| 21 | Measles | 12 | 10 | 7 | 4 | 10 | 12 | 6 | 16 | 14 | 6 | 5 | 10 | 24 | 11 | 26 |
| 22 | Diphtheria | 16 | 8 | 7 | 7 | 6 | 8 | 6 | 7 | 10 | 13 | 14 | 15 | 17 | 25 | 34 |
| 23 | Typho-mal. fever ‡ | 18 | 12 | 4 | 5 | 6 | 7 | 16 | 15 | 16 | 16 | 16 | 20 | 18 | 24 | 29 |
| 24 | Puerperal fever | 5 | 4 | 3 | 4 | 3 | 4 | 5 | 4 | 6 | 5 | 6 | 7 | 7 | 7 | 5 |
| 25 | Inflam. of brain ‡ | 5 | 5 | 3 | 3 | 4 | 5 | 5 | 5 | 6 | 5 | 6 | 7 | 8 | 5 | 5 |
| 26 | Membranous croup | 5 | 4 | 2 | 3 | 4 | 4 | 3 | 4 | 4 | 5 | 5 | 6 | 6 | 7 | 9 |
| 27 | Cerebro-spi. men. | 4 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 6 | 7 | 5 | 6 | 9 |
| 28 | Small-pox | 0.7 | 0.1 | 0.3 | .02 | 0 | 0.1 | .03 | .03 | .02 | 0.4 | 0.2 | 0.1 | 0.3 | 3 | 2 |
| | No. of reports received | 4,447 | 5,005 | 5,853 | 5,281 | 4,291 | 4,939 | 5,000 | 5,047 | 4,896 | 5,583 | 5,108 | 3,957 | 4,458 | 4,745 | 3,567 |

* For 1893 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III., page 90; the names of the observers and the number of the reports received from each are stated in Exhibit V., pages 94, 95 and 96.

† The numbers opposite the names of the diseases do not state what per cent of the whole number of reports for the year stated the disease to be present at some time during the year, but state (on an average for twelve months of the year), what per cent of reports for the several months stated the disease to be present in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the reports for that month (the number of which is stated at the foot of the column) stated the given disease to be present in that month. [‡ For foot-note see a subsequent page.]

EXHIBIT IV.—CONTINUED.– *Stating for each of 28 Diseases by months, on what Per and 1893; also the Averages by Months for the Period of seven*

What Per Cent of the Reports Received stated Presence of the Disease.‡

| Line number. | January.* Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | February.* Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | March.* Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Disease† | 28 | 25 | 21 | 26 | Average Disease† | 29 | 26 | 21 | 25 | Average Disease† | 29 | 26 | 20 | 24 |
| 1 | Bronchitis | 74 | 70 | 67 | 72 | Bronchitis | 75 | 72 | 67 | 70 | Rheumatism | 74 | 73 | 68 | 69 |
| 2 | Rheumatism | 72 | 71 | 66 | 71 | Rheumatism | 72 | 70 | 67 | 68 | Neuralgia | 73 | 72 | 65 | 72 |
| 3 | Tonsillitis | 59 | 58 | 62 | 57 | Neuralgia | 71 | 71 | 62 | 75 | Bronchitis | 75 | 72 | 62 | 64 |
| 4 | Neuralgia | 69 | 69 | 57 | 73 | Tonsillitis | 60 | 58 | 59 | 59 | Tonsillitis | 60 | 59 | 61 | 59 |
| 5 | Influenza | 60 | 64 | 56 | 97 | Influenza | 64 | 67 | 58 | 92 | Influenza | 61 | 61 | 57 | 77 |
| 6 | Consumption, Pul. | 59 | 52 | 35 | 45 | Consumption, Pul. | 60 | 52 | 38 | 45 | Consumption, Pul. | 61 | 53 | 43 | 40 |
| 7 | Pneumonia | 55 | 49 | 34 | 69 | Pneumonia | 59 | 51 | 36 | 54 | Pneumonia | 55 | 47 | 34 | 37 |
| 8 | Diarrhea | 27 | 28 | 28 | 30 | Diarrhea | 28 | 28 | 25 | 30 | Diarrhea | 30 | 30 | 25 | 32 |
| 9 | Pleuritis | 28 | 20 | 21 | 36 | Pleuritis | 28 | 20 | 20 | 35 | Pleuritis | 27 | 20 | 21 | 25 |
| 10 | Inflam. of Kidney | 22 | 21 | 19 | 24 | Inflam. of Kidney | 23 | 21 | 18 | 24 | Inflam. of Kidney | 23 | 22 | 20 | 25 |
| 11 | Intermittent Fever | 49 | 36 | 19 | 22 | Erysipelas | 26 | 25 | 18 | 21 | Intermittent Fever | 53 | 38 | 18 | 21 |
| 12 | Scarlet Fever | 19 | 12 | 16 | 11 | Intermittent Fever | 51 | 36 | 14 | 23 | Erysipelas | 27 | 26 | 15 | 23 |
| 13 | Erysipelas | 26 | 24 | 14 | 22 | Remittent Fever | 33 | 25 | 13 | 14 | Remittent Fever | 35 | 25 | 14 | 13 |
| 14 | Remittent Fever | 34 | 26 | 13 | 11 | Measles | 13 | 13 | 12 | 6 | Inflam. of Bowels | 14 | 13 | 11 | 13 |
| 15 | Diphtheria | 21 | 11 | 10 | 8 | Scarlet Fever | 19 | 11 | 12 | 10 | Measles | 16 | 16 | 10 | 6 |
| 16 | Measles | 10 | 8 | 10 | 2 | Diphtheria | 17 | 8 | 9 | 3 | Scarlet Fever | 19 | 12 | 10 | 16 |
| 17 | Inflam. of Bowels | 13 | 13 | 8 | 13 | Whooping-cough | 17 | 12 | 9 | 8 | Whooping-cough | 17 | 13 | 7 | 9 |
| 18 | Dysentery | 7 | 6 | 7 | 8 | Inflam. of Bowels | 13 | 13 | 8 | 9 | Dysentery | 7 | 7 | 7 | 8 |
| 19 | Whooping-cough | 16 | 10 | 7 | 8 | Membran. Croup | 8 | 6 | 5 | 9 | Diphtheria | 15 | 7 | 6 | 6 |
| 20 | Typhoid Fev. (ent.) | 10 | 7 | 6 | 7 | Dysentery | 7 | 7 | 5 | 7 | Cholera morbus | 5 | 3 | 5 | 3 |
| 21 | Puerperal Fever | 5 | 5 | 5 | 5 | Cholera morbus | 4 | 3 | 4 | 4 | Membran. Croup | 7 | 5 | 4 | 3 |
| 22 | Typho-mal. Fever | 14 | 8 | 5 | 2 | Typhoid Fev. (ent.) | 7 | 5 | 4 | 5 | Puerperal Fever | 6 | 5 | 3 | 6 |
| 23 | Cerebro-spi. men. | 3 | 2 | 4 | 1 | Puerperal Fever | 5 | 5 | 4 | 5 | Typhoid Fev. (ent.) | 6 | 4 | 3 | 4 |
| 24 | Cholera morbus | 4 | 3 | 4 | 3 | Inflam. of Brain | 6 | 6 | 3 | 3 | Inflam. of Brain | 6 | 6 | 3 | 3 |
| 25 | Inflam. of Brain | 5 | 5 | 3 | 2 | Cerebro-spi. men. | 4 | 3 | 2 | 2 | Typho-mal. Fever | 11 | 7 | 2 | 0.5 |
| 26 | Membran. Croup | 10 | 7 | 2 | 7 | Typho-mal. Fever | 12 | 7 | 2 | 1 | Cholera infantum | 2 | 1 | 1 | 2 |
| 27 | Cholera infantum | 2 | 2 | 2 | 1 | Small-pox | 1 | 0.4 | 2 | 0 | Cerebro-spi. men. | 5 | 4 | 1 | 2 |
| 28 | Small-pox | 1.2 | 0.4 | 1 | 0 | Cholera infantum | 2 | 2 | 1 | 3 | Small-pox | 0.6 | 0.1 | 0.2 | 0 |
| | Reports received§ | 365 | 391 | 483 | 348 | Reports received§ | 338 | 381 | 480 | 382 | Reports received§ | 335 | 399 | 536 | 451 |

| Line number. | April.* Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | May.* Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | June.* Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Disease† | 28 | 26 | 20 | 24 | Average Disease† | 27 | 24 | 19 | 20 | Average Disease† | 25 | 22 | 18 | 19 |
| 1 | Rheumatism | 75 | 74 | 73 | 68 | Rheumatism | 72 | 72 | 67 | 67 | Rheumatism | 68 | 69 | 61 | 64 |
| 2 | Neuralgia | 72 | 71 | 61 | 71 | Neuralgia | 67 | 66 | 56 | 62 | Neuralgia | 64 | 62 | 50 | 57 |
| 3 | Bronchitis | 71 | 69 | 64 | 67 | Bronchitis | 61 | 61 | 54 | 56 | Bronchitis | 52 | 50 | 42 | 47 |
| 4 | Tonsillitis | 54 | 55 | 54 | 60 | Tonsillitis | 47 | 47 | 49 | 48 | Tonsillitis | 40 | 39 | 37 | 41 |
| 5 | Influenza | 54 | 56 | 48 | 56 | Consumption, Pul. | 59 | 51 | 43 | 33 | Consumption, Pul. | 58 | 48 | 37 | 35 |
| 6 | Consumption, Pul. | 63 | 54 | 45 | 41 | Influenza | 39 | 40 | 40 | 29 | Diarrhea | 43 | 40 | 36 | 33 |
| 7 | Pneumonia | 49 | 40 | 31 | 30 | Diarrhea | 35 | 33 | 28 | 30 | Intermittent Fever | 66 | 44 | 25 | 25 |
| 8 | Diarrhea | 31 | 30 | 29 | 32 | Intermittent Fever | 64 | 43 | 26 | 29 | Influenza | 28 | 37 | 21 | 20 |
| 9 | Intermittent Fever | 60 | 44 | 25 | 29 | Pneumonia | 37 | 31 | 20 | 26 | Remittent Fever | 40 | 27 | 21 | 19 |
| 10 | Inflam. of Kidney | 24 | 25 | 22 | 31 | Inflam. of Kidney | 24 | 24 | 21 | 27 | Inflam. of Kidney | 22 | 21 | 19 | 21 |
| 11 | Erysipelas | 27 | 27 | 18 | 24 | Remittent Fever | 39 | 27 | 19 | 19 | Erysipelas | 23 | 22 | 14 | 16 |
| 12 | Pleuritis | 25 | 18 | 17 | 23 | Erysipelas | 25 | 24 | 17 | 19 | Inflam. of Bowels | 15 | 15 | 13 | 15 |
| 13 | Remittent Fever | 37 | 27 | 14 | 19 | Measles | 24 | 19 | 17 | 5 | Measles | 20 | 16 | 18 | 7 |
| 14 | Scarlet Fever | 18 | 12 | 12 | 18 | Pleuritis | 20 | 14 | 13 | 20 | Cholera morbus | 17 | 14 | 13 | 15 |
| 15 | Measles | 21 | 18 | 11 | 8 | Scarlet Fever | 16 | 11 | 11 | 16 | Pneumonia | 22 | 16 | 12 | 13 |
| 16 | Inflam. of Bowels | 12 | 12 | 11 | 9 | Whooping-cough | 17 | 14 | 10 | 8 | Whooping-cough | 17 | 13 | 12 | 10 |
| 17 | Whooping-cough | 16 | 13 | 7 | 12 | Diphtheria | 13 | 7 | 8 | 7 | Pleuritis | 15 | 11 | 11 | 14 |
| 18 | Diphtheria | 15 | 7 | 6 | 10 | Inflam. of Bowels | 13 | 14 | 8 | 12 | Scarlet Fever | 14 | 9 | 11 | 13 |
| 19 | Puerperal Fever | 5 | 6 | 5 | 8 | Cholera morbus | 8 | 7 | 4 | 7 | Diphtheria | 11 | 6 | 9 | 6 |
| 20 | Cholera morbus | 5 | 4 | 4 | 5 | Dysentery | 9 | 8 | 4 | 6 | Cholera infantum | 9 | 8 | 9 | 5 |
| 21 | Dysentery | 8 | 7 | 4 | 8 | Puerperal Fever | 5 | 5 | 4 | 3 | Dysentery | 12 | 10 | 9 | 11 |
| 22 | Typho-mal. Fever | 10 | 7 | 3 | 2 | Typhoid Fev. (ent.) | 5 | 3 | 4 | 3 | Typhoid Fev. (ent.) | 5 | 4 | 6 | 4 |
| 23 | Inflam. of Brain | 6 | 5 | 3 | 4 | Inflam. of Brain | 5 | 5 | 2 | 4 | Puerperal Fever | 5 | 5 | 5 | 4 |
| 24 | Typhoid Fev. (ent.) | 5 | 3 | 3 | 4 | Cerebro-spi. men. | 5 | 3 | 2 | 3 | Inflam. of Brain | 6 | 5 | 3 | 4 |
| 25 | Membran. Croup | 6 | 5 | 2 | 4 | Typho-mal. Fever | 10 | 7 | 2 | 2 | Cerebro-spi. men. | 4 | 3 | 2 | 2 |
| 26 | Cerebro-spi. men. | 5 | 3 | 1 | 1 | Membran. Croup | 4 | 4 | 2 | 4 | Typho-mal. Fever | 10 | 6 | 1 | 4 |
| 27 | Cholera infantum | 2 | 1 | 1 | 3 | Cholera infantum | 3 | 3 | 1 | 4 | Membran. Croup | 3 | 2 | 0.2 | 2 |
| 28 | Small-pox | 1 | .04 | 0.2 | 0 | Small-pox | 1.5 | .07 | 0 | 0.3 | Small-pox | 1.2 | .06 | 0.2 | 0 |
| | Reports received§ | 317 | 314 | 406 | 320 | Reports received§ | 358 | 398 | 529 | 353 | Reports received§ | 362 | 420 | 442 | 425 |

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* For 1893 the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III., page 90, the names of observers and the number of reports received from each are stated in Exhibit V., pages 94, 95 and 96.

*Cent of the Reports Received the diseases stated to be Present in each of the years 1892 years, 1886–1892, and for the Period of sixteen years, 1877–1892.*

| What Per Cent of the Reports Received stated Presence of the Disease.‡ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| July.* | | | | | August.* | | | | | September.* | | | | | |
| Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Diseases. | Av. '77–'91. | Av. '86–'92. | 1893. | 1892. | Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Line number. |
| Average Disease†. | 27 | 24 | 18 | 19 | Average Disease†. | 30 | 26 | 21 | 22 | Average Disease†. | 30 | 26 | 21 | 23 | |
| Rheumatism | 61 | 61 | 60 | 56 | Diarrhea | 84 | 81 | 74 | 72 | Diarrhea | 78 | 76 | 75 | 74 | 1 |
| Diarrhea | 70 | 66 | 54 | 55 | Rheumatism | 58 | 59 | 58 | 57 | Rheumatism | 61 | 63 | 57 | 58 | 2 |
| Neuralgia | 60 | 60 | 51 | 54 | Neuralgia | 57 | 57 | 53 | 53 | Neuralgia | 60 | 59 | 54 | 53 | 3 |
| Tonsillitis | 33 | 32 | 37 | 34 | Cholera morbus | 55 | 51 | 43 | 39 | Dysentery | 46 | 42 | 41 | 38 | 4 |
| Bronchitis | 43 | 48 | 35 | 37 | Consumption, Pul. | 53 | 46 | 37 | 37 | Bronchitis | 48 | 47 | 39 | 42 | 5 |
| Consumption, Pul. | 55 | 47 | 35 | 39 | Cholera infantum. | 45 | 42 | 34 | 30 | Cholera morbus | 38 | 36 | 38 | 37 | 6 |
| Intermittent Fever | 68 | 47 | 27 | 29 | Tonsillitis | 32 | 31 | 34 | 34 | Consumption, Pul. | 54 | 46 | 37 | 39 | 7 |
| Cholera morbus | 43 | 38 | 24 | 29 | Bronchitis | 41 | 41 | 34 | 38 | Tonsillitis | 37 | 36 | 35 | 36 | 8 |
| Remittent Fever | 43 | 29 | 20 | 28 | Dysentery | 51 | 45 | 34 | 28 | Cholera infantum. | 34 | 32 | 33 | 28 | 9 |
| Cholera infantum. | 29 | 27 | 17 | 17 | Intermittent Fever | 68 | 48 | 32 | 33 | Intermittent Fever | 68 | 47 | 29 | 32 | 10 |
| Inflam. of Kidney. | 19 | 19 | 17 | 18 | Remittent Fever | 49 | 36 | 22 | 30 | Remittent Fever | 51 | 27 | 25 | 31 | 11 |
| Erysipelas | 19 | 18 | 15 | 15 | Inflam. of Bowels. | 20 | 19 | 20 | 18 | Influenza | 28 | 25 | 25 | 23 | 12 |
| Influenza | 20 | 18 | 14 | 15 | Influenza | 20 | 17 | 16 | 17 | Typhoid Fev. (ent.) | 20 | 18 | 16 | 16 | 13 |
| Dysentery | 28 | 23 | 13 | 12 | Inflam of Kidney. | 18 | 17 | 13 | 20 | Inflam. of Bowels. | 14 | 17 | 16 | 17 | 14 |
| Inflam. of Bowels. | 16 | 17 | 13 | 15 | Whooping-cough | 19 | 15 | 13 | 15 | Inflam. of Kidney. | 17 | 16 | 14 | 15 | 15 |
| Whooping-cough | 19 | 15 | 11 | 14 | Typhoid Fev. (ent.) | 13 | 13 | 12 | 13 | Pleuritis | 11 | 8 | 9 | 10 | 16 |
| Pleuritis | 11 | 8 | 11 | 10 | Erysipelas | 18 | 17 | 8 | 11 | Typho-mal. Fever. | 33 | 21 | 9 | 9 | 17 |
| Pneumonia | 14 | 11 | 8 | 10 | Diphtheria | 12 | 6 | 8 | 5 | Pneumonia | 15 | 12 | 9 | 12 | 18 |
| Measles | 12 | 9 | 8 | 4 | Pneumonia | 12 | 9 | 7 | 7 | Erysipelas | 17 | 16 | 9 | 12 | 19 |
| Scarlet Fever | 11 | 6 | 7 | 7 | Pleuritis | 9 | 7 | 7 | 10 | Whooping-cough | 18 | 13 | 9 | 12 | 20 |
| Typhoid Fev. (ent.) | 7 | 6 | 7 | 5 | Scarlet Fever | 10 | 6 | 7 | 6 | Scarlet Fever | 11 | 7 | 7 | 10 | 21 |
| Diphtheria | 11 | 6 | 7 | 4 | Typho-mal. Fever. | 21 | 16 | 7 | 7 | Diphtheria | 14 | 7 | 6 | 6 | 22 |
| Puerperal Fever | 4 | 4 | 4 | 5 | Measles | 6 | 4 | 3 | 2 | Puerperal Fever | 4 | 4 | 3 | 2 | 23 |
| Typho-mal. Fever. | 13 | 8 | 2 | 5 | Puerperal Fever | 4 | 3 | 3 | 3 | Inflam. of Brain | 5 | 4 | 2 | 4 | 24 |
| Inflam. of Brain | 6 | 5 | 2 | 5 | Inflam. of Brain | 6 | 5 | 2 | 3 | Cerebro-spi. men. | 4 | 3 | 2 | 1 | 25 |
| Cerebro-spi. men. | 4 | 3 | 2 | 2 | Membran. Croup | 2 | 1.4 | 1 | 1 | Measles | 4 | 3 | 2 | 1 | 26 |
| Membran. Croup | 2 | 1.4 | 1 | 2 | Cerebro-spi. men. | 4 | 3 | 1 | 2 | Membran. Croup | 3 | 2 | .02 | 2 | 27 |
| Small-pox | 1 | 0.1 | 0 | 0 | Small-pox | 0.5 | 0.1 | 0 | 0 | Small-pox | 0.3 | 0.1 | 0 | 0 | 28 |
| Reports received§ | 389 | 436 | 465 | 455 | Reports received§ | 407 | 465 | 568 | 608 | Reports received§ | 388 | 448 | 458 | 464 | |

| October.* | | | | | November.* | | | | | December.* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Line number. |
| Average Disease†. | 28 | 24 | 20 | 22 | Average Disease†. | 27 | 23 | 20 | 20 | Average Disease†. | 27 | 24 | 20 | 23 | |
| Rheumatism | 67 | 68 | 64 | 63 | Rheumatism | 70 | 68 | 64 | 63 | Influenza | 49 | 50 | 93 | 53 | 1 |
| Neuralgia | 62 | 62 | 55 | 56 | Influenza | 40 | 38 | 62 | 34 | Rheumatism | 72 | 70 | 65 | 70 | 2 |
| Diarrhea | 54 | 51 | 55 | 52 | Bronchitis | 64 | 61 | 61 | 57 | Bronchitis | 70 | 66 | 62 | 68 | 3 |
| Bronchitis | 55 | 55 | 48 | 50 | Neuralgia | 67 | 65 | 60 | 59 | Neuralgia | 68 | 67 | 57 | 62 | 4 |
| Tonsillitis | 45 | 45 | 44 | 44 | Tonsillitis | 54 | 53 | 53 | 55 | Tonsillitis | 59 | 58 | 55 | 63 | 5 |
| Consumption, Pul. | 56 | 46 | 32 | 36 | Consumption, Pul. | 57 | 46 | 37 | 34 | Consumption, Pul. | 57 | 49 | 38 | 37 | 6 |
| Influenza | 32 | 31 | 29 | 22 | Diarrhea | 35 | 33 | 29 | 27 | Pneumonia | 40 | 33 | 34 | 28 | 7 |
| Intermittent Fever | 65 | 45 | 28 | 28 | Intermittent Fever | 58 | 40 | 26 | 24 | Diarrhea | 28 | 27 | 24 | 28 | 8 |
| Dysentery | 23 | 21 | 25 | 23 | Pneumonia | 30 | 24 | 24 | 20 | Pleuritis | 21 | 16 | 22 | 21 | 9 |
| Remittent Fever. | 50 | 36 | 24 | 26 | Remittent Fever | 41 | 31 | 21 | 23 | Intermittent Fever | 51 | 34 | 17 | 21 | 10 |
| Typhoid Fev. (ent.) | 21 | 19 | 23 | 17 | Typhoid Fev. (ent.) | 19 | 15 | 20 | 11 | Erysipelas | 23 | 22 | 15 | 15 | 11 |
| Cholera infantum. | 12 | 11 | 15 | 16 | Inflam. of Kidney. | 20 | 20 | 15 | 20 | Inflam. of Kidney. | 21 | 20 | 12 | 17 | 12 |
| Inflam. of Bowels | 14 | 14 | 14 | 13 | Pleuritis | 17 | 12 | 12 | 17 | Scarlet Fever | 15 | 11 | 12 | 13 | 13 |
| Inflam. of Kidney. | 19 | 18 | 14 | 21 | Erysipelas | 22 | 20 | 12 | 14 | Remittent Fever | 36 | 27 | 12 | 20 | 14 |
| Cholera morbus | 15 | 13 | 13 | 17 | Scarlet Fever | 15 | 11 | 11 | 14 | Inflam. of Bowels | 14 | 14 | 9 | 9 | 15 |
| Pneumonia | 20 | 17 | 12 | 13 | Inflam. of Bowels | 13 | 12 | 10 | 8 | Whooping-cough | 15 | 10 | 8 | 8 | 16 |
| Erysipelas | 20 | 19 | 11 | 14 | Dysentery | 11 | 10 | 9 | 10 | Typhoid Fev. (ent.) | 14 | 11 | 8 | 12 | 17 |
| Pleuritis | 15 | 10 | 10 | 12 | Typho-mal. Fever. | 26 | 15 | 8 | 8 | Diphtheria | 21 | 10 | 6 | 13 | 18 |
| Scarlet Fever | 14 | 11 | 10 | 9 | Diphtheria | 22 | 11 | 8 | 10 | Typho-mal. Fever. | 17 | 9 | 4 | 7 | 19 |
| Typho-mal. Fever | 35 | 22 | 8 | 7 | Whooping-cough | 16 | 10 | 7 | 9 | Cholera morbus | 5 | 4 | 3 | 4 | 20 |
| Whooping-cough | 15 | 10 | 7 | 7 | Cholera morbus | 6 | 5 | 5 | 6 | Inflam. of Brain | 5 | 5 | 2 | 3 | 21 |
| Diphtheria | 20 | 11 | 6 | 9 | Membran. Croup | 7 | 5 | 3 | 4 | Membran. Croup | 9 | 6 | 2 | 5 | 22 |
| Inflam. of Brain | 5 | 4 | 4 | 1 | Puerperal Fever | 4 | 3 | 3 | 4 | Dysentery | 7 | 7 | 2 | 6 | 23 |
| Puerperal Fever | 5 | 4 | 2 | 2 | Cholera infantum. | 4 | 3 | 2 | 4 | Cerebro-spi. men. | 3 | 2 | 2 | 1 | 24 |
| Cerbro-spi. men. | 4 | 2 | 1 | 2 | Inflam. of Brain | 5 | 4 | 2 | 3 | Measles | 7 | 6 | 2 | 5 | 25 |
| Membran. Croup | 5 | 4 | 1 | 2 | Measles | 5 | 4 | 2 | 2 | Puerperal Fever | 4 | 4 | 1 | 3 | 26 |
| Measles | 4 | 3 | 1 | 2 | Cerebro-spi. men | 3 | 2 | 1 | 1 | Cholera infantum | 2 | 1 | 1 | 3 | 27 |
| Small-pox | 0.3 | 0.1 | 0 | 0 | Small-pox | 0.5 | 0.2 | 0 | 0 | Small-pox | 0.6 | 0.3 | 0 | 0 | 28 |
| Reports received§ | 401 | 453 | 459 | 452 | Reports received§ | 371 | 440 | 576 | 580 | Reports received§ | 386 | 430 | 451 | 443 | |

† The numbers in this line are an average, not for all diseases represented, but only for those reported present in the given month. ‡ See foot-note with this mark on a subsequent page.

§ The numbers in this line state how many reports were received for the month in the given year.

* † ‡ These notes are on page 91.

EXHIBIT V.—*By Months and by Geographical Divisions of the State,* the Names of 205 Observers, whose weekly Reports of Diseases for 1893, are Compiled in Tables 1, 2, 3 and 4, the Localities*[a] *for which they Report, and the Number of Reports Received from each Observer.*

| Divisions and localities represented and physicians who reported. (Health Officers in Italics.) | Weekly Reports in 1893.—Compiled in this Article. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year, 1893. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| All localities | 5,853 | 483 | 480 | 536 | 406 | 529 | 442 | 465 | 568 | 458 | 459 | 576 | 451 |
| Upper Peninsular Division * | 429 | 41 | 38 | 37 | 23 | 32 | 29 | 35 | 41 | 32 | 33 | 47 | 41 |
| Crystal Falls, *C. C. Moffett, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Escanaba, *C. H. Long, M. D.* | 12 | 4 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Escanaba, *Otis E. Younggquist, M. D.* | 23 | ---- | ---- | ---- | ---- | 5 | 3 | 4 | 4 | ---- | ---- | 3 | 4 |
| Houghton, *H. W. Jones, M. D.* | 22 | ---- | ---- | ---- | ---- | 5 | 2 | 3 | ---- | ---- | 3 | 5 | 4 |
| Iron Mountain, *C. F. Larson, M. D.* | 49 | 4 | 4 | 5 | 4 | 4 | 4 | 3 | 5 | 4 | 4 | 4 | 4 |
| Ironwood, *J. K. Niven, M. D.* | 24 | 4 | 3 | 5 | 4 | 5 | 3 | ---- | ---- | ---- | ---- | ---- | ---- |
| Ishpeming, *G. G. Barnett, M. D.* | 37 | 4 | 4 | ---- | 3 | ---- | 2 | 2 | 5 | 4 | 4 | 5 | 4 |
| Lake Linden, *Geo. W. Orr, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Lake Linden, *J. M. P. Pichette, M. D.* | 33 | ---- | ---- | ---- | ---- | 3 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Mackinac Island, *James H. Bogan, M. D.* | 11 | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 5 | 2 | ---- | ---- | 2 |
| Menominee, *Eugene Grignon, M. D.* | 14 | 2 | 4 | 5 | 3 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Menominee, *H. L. Rosenberry, M. D.* | 22 | ---- | ---- | ---- | ---- | ---- | 3 | 3 | 3 | 2 | 2 | 5 | 4 |
| Naubinway, *Theo. Grenier, M. D.* | 17 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 4 | 5 | 4 |
| Newberry, *S. John Fraser, M. D.* | 8 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Palmer, *H. M. Haskell, M. D.* | 41 | 4 | 3 | 3 | 3 | 5 | ---- | 3 | 5 | 4 | 3 | 5 | 3 |
| Rockland, *W. C. Gates, M. D.* | 26 | 3 | ---- | ---- | 2 | ---- | 4 | 3 | ---- | 2 | 3 | 5 | 4 |
| St. Ignace, *W. G. Young, M. D.* | 14 | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 4 | 4 | 2 | ---- | ---- |
| Wakefield, *J. H. Eddy, M. D.* | 50 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 2 | 4 | 5 | 4 |
| Northwestern Division * | 130 | 11 | 11 | 15 | 14 | 18 | 17 | 13 | 11 | 4 | 8 | 5 | 3 |
| Cadillac, *David Ralston, M. D.* | 5 | ---- | ---- | ---- | ---- | ---- | 2 | ---- | 3 | ---- | ---- | ---- | ---- |
| Copemish, *C. B. Marks, M. D.* | 29 | 3 | 4 | 5 | 4 | 5 | 4 | 4 | ---- | ---- | ---- | ---- | ---- |
| Fife Lake, *Lewis S. Walter, M. D.* | 47 | 4 | 3 | 5 | 3 | 5 | 4 | 3 | 4 | 4 | 4 | 5 | 3 |
| Lake Ann, *Geo. K. Shirton, M. D.* | 19 | ---- | ---- | ---- | 3 | 3 | 3 | 2 | 4 | ---- | 4 | ---- | ---- |
| Manton, *Edward Morgan, M. D.* | 30 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | ---- | ---- | ---- | ---- | ---- |
| Northern Division * | 197 | 22 | 24 | 11 | 7 | 12 | 15 | 18 | 20 | 16 | 15 | 20 | 17 |
| Boyne City, *A. D. DeLacey, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Boyne City, *Chas. Deuell* | 35 | ---- | ---- | ---- | ---- | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Charlevoix, *Frank W. LeFevre, M. D.* | 12 | 4 | 4 | ---- | ---- | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Cheboygan, *S. A. St. Armour, M. D.* | 24 | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 5 | 4 | 4 | 4 | 3 |
| Harbor Springs, *Levi W. Gardner, M. D.* | 8 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Kalkaska, *R. S. Trask, M. D.* | 7 | 3 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Kalkaska, *Seymour A. Johnson, M. D.* | 29 | ---- | ---- | ---- | ---- | ---- | 4 | 4 | 5 | 4 | 3 | 5 | 4 |
| Mackinaw City, *J. J. Reycraft, M. D.* | 31 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | ---- | ---- | 4 | 3 | 2 |
| Petoskey, *Arthur G. Oven, M. D.* | 38 | 4 | 4 | 3 | 4 | ---- | 4 | 3 | 5 | 4 | ---- | 3 | 4 |
| Northeastern Division * | 128 | 12 | 12 | 15 | 8 | 10 | 10 | 12 | 15 | 8 | 8 | 10 | 8 |
| Harrisville, *D. W. Mitchell, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Oscoda, *E. C. Beem, M. D.* | 11 | ---- | ---- | ---- | ---- | ---- | 2 | 4 | 5 | ---- | ---- | ---- | ---- |
| Rogers City, *Chas. W. Isaminger, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Tawas City, *G. S. Darling, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Western Division * | 448 | 39 | 43 | 47 | 37 | 38 | 28 | 35 | 43 | 33 | 33 | 42 | 30 |
| Cannonsburg, C. R Crosby, M. D. | 48 | 4 | 4 | 4 | 4 | 5 | 3 | 4 | 5 | 4 | 4 | 4 | 3 |
| Cedar Springs, C. S. Ford, M. D. | 16 | 4 | 4 | 5 | 3 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Grand Rapids, A. Hezlewood, M. D. | 29 | 4 | 4 | 5 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | 4 | 4 |
| Grand Haven, *J. B. McNett, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Grand Haven, *A. VanderVeen, M. D.* | 37 | ---- | ---- | ---- | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 2 |
| Hart, *H. B. Hatch, M. D.* | 10 | ---- | ---- | ---- | ---- | ---- | 2 | 4 | 4 | ---- | ---- | ---- | ---- |
| Hesperia, *H. C. Hawley, M. D.* | 47 | 3 | 4 | 4 | 2 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 3 |
| Lisbon, *Thos. J. Appleton, M. D.* | 12 | 4 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Lowell, *Otto C. McDannell, M. D.* | 51 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 3 | 4 | 5 | 4 |
| Luther, *Earl Fairbanks, M. D.* | 19 | ---- | ---- | ---- | ---- | ---- | ---- | 3 | 4 | 3 | 3 | 4 | 2 |
| Muskegon, *J. F. Denslow, M. D.* | 8 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Muskegon, *Geo. L. LeFevre, M. D.* | 33 | ---- | ---- | ---- | ---- | 3 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| N. Muskegon, *Perly W. Pearsall, M. D.* | 46 | ---- | 3 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Sand Lake, *A. R. Hicks, M. D.* | 12 | ---- | ---- | ---- | 4 | 3 | ---- | ---- | ---- | 3 | 2 | ---- | ---- |
| Whitehall, *John Busby, M. D.* | 17 | 4 | 4 | 5 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| White Cloud, *W. A. Kuhn, M. D.* | 50 | 4 | 4 | 5 | 4 | 4 | 3 | 4 | 5 | 4 | 4 | 5 | 4 |
| Northern Central Division * | 138 | 16 | 16 | 18 | 15 | 14 | 11 | 7 | 8 | 7 | 8 | 10 | 8 |
| Big Rapids, *Wm. E. Dockry, M. D.* | 17 | 4 | 4 | 5 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Big Rapids, *C. P. Bigelow, M. D.* | 23 | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 3 | 3 | 4 | 5 | 4 |
| Blanchard, *L. A. Houghton, M. D.* | 24 | 4 | 4 | 5 | 4 | 4 | 3 | ---- | ---- | ---- | ---- | ---- | ---- |
| Clare, *Joseph H. Carpenter, M. D.* | 51 | 4 | 4 | 5 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| Coleman, *A. V. Linton, M. D.* | 11 | 4 | 4 | 3 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Roscommon, *J. H. Curnalia, M. D.* | 12 | ---- | ---- | ---- | 3 | 5 | 4 | ---- | ---- | ---- | ---- | ---- | ---- |

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a In many cases the reports include sickness in the vicinity as well as the corporate limits of the places named.

* For counties in each division see Exhibit I, page 87.

## EXHIBIT V.—CONTINUED.

| Divisions and localities represented and physicians who reported. ( Health Officers in Italics.) | Weekly Reports in 1893.—Compiled in this Article. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year, 1893. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Bay and Eastern Division* | 788 | 49 | 54 | 67 | 56 | 72 | 60 | 60 | 87 | 69 | 67 | 82 | 65 |
| Algonac, *W. K. Moore, M. D.* | 46 | 2 | 4 | 3 | 4 | 5 | 4 | 4 | 5 | 3 | 4 | 5 | 3 |
| Capac, *James R. McGurk, M. D.* | 39 | 4 | 4 | 5 | 4 | ---- | ---- | ---- | 5 | 4 | 4 | 5 | 4 |
| Cass City, *J. M. Truscott, M. D.* | 48 | ---- | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Caro, *D. S. Stevens, M. D.* | 5 | ---- | ---- | ---- | ---- | 3 | 2 | ---- | ---- | ---- | ---- | ---- | ---- |
| Chesaning, *D. W. Mudge, M. D.* | 37 | ---- | ---- | ---- | 3 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| Columbiaville, *C. A. Wisner, M. D.* | 13 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 5 | 4 |
| Croswell, *T. S. Kingston, M. D.* | 45 | 4 | 3 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | ---- | 3 | 4 |
| Deckerville, *Geo. C. Vincent, M. D.* | 25 | ---- | ---- | ---- | ---- | ---- | 2 | 4 | 5 | 4 | 3 | 3 | 4 |
| Essexville, O. A. Lloyd | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Essexville, *Harry J. Garber, M. D.* | 38 | ---- | ---- | ---- | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Hadley, *Leonidas Harger, M. D.* | 12 | 4 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Marine City, *S. W. Hadden, M. D.* | 17 | 4 | 4 | 5 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Marine City, *F. Blagborne, M. D.* | 28 | ---- | ---- | ---- | ---- | ---- | 4 | 4 | 5 | 4 | 4 | 4 | 3 |
| Mayville, *Benj. D'Arcy, M. D.* | 23 | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 5 | 3 | 2 | 5 | 4 |
| Metamora, *G. W. Stone, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Port Austin, *Sarah A. Cole, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Port Huron, *J. Edson Covey, M. D.* | 32 | ---- | ---- | ---- | ---- | 4 | 4 | 4 | 4 | 3 | 4 | 5 | 4 |
| Port Sanilac, *Grant D. Soper, M. D.* | 46 | 3 | 3 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 3 | 2 |
| Sanilac Center, *L. C. Reed, M. D.* | 15 | 4 | 4 | 5 | 2 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Sanilac Center, *Geo. S. Tweedie, M. D.* | 12 | ---- | ---- | ---- | ---- | ---- | ---- | -- | 5 | 4 | 3 | ---- | ---- |
| Saginaw (W. S.), *S. E. Campbell, M. D.* | 50 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 3 | 5 | 3 |
| Thornville, *J. S. Caulkins, M. D.* | 49 | 4 | 4 | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 4 | 4 | 4 |
| Unionville, *W. C. Wright, M. D.* | 22 | 4 | 4 | 5 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Unionville, *J. Wood, M. D.* | 35 | ---- | ---- | ---- | 2 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 2 |
| Vassar, *John C. Avery, M. D.* | 34 | ---- | ---- | ---- | 2 | 5 | 4 | 2 | 4 | 4 | 4 | 5 | 4 |
| Central Division* | 1,073 | 89 | 86 | 91 | 65 | 92 | 80 | 87 | 96 | 90 | 91 | 116 | 90 |
| Alma, *I. N. Brainerd, M. D.* | 50 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 4 | 3 |
| Bancroft, *Geo. Cosgrove, M. D.* | 15 | 4 | 2 | 5 | 4 | ---- | ---- | ---- | ---- | -- | ---- | ---- | ---- |
| Brighton, *W. C. Brown, M. D.* | 27 | 3 | 4 | 5 | 4 | 5 | ---- | ---- | ---- | 2 | ---- | ---- | 4 |
| Carson City, *J. Tennant, M. D.* | 23 | ---- | ---- | ---- | ---- | ---- | ---- | 3 | 5 | 4 | 3 | 4 | 4 |
| Charlotte, *G. B. Allen, M. D.* | 14 | ---- | ---- | ---- | ---- | 5 | 4 | 2 | 3 | ---- | ---- | ---- | ---- |
| Charlotte, *P. B. Patterson, M. D.* | 13 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 5 | 4 |
| Corunna, *W. C. Hume, M. D.* | 8 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Durand, *Frank S. Love, M. D.* | 45 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 2 | ---- | 5 | 3 |
| Flushing, *C. S. Wheeler, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Fowler, *Geo. C. Havens, M. D.* | 12 | 4 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Gaines, *E. H. Austin, M. D.* | 8 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 4 | ---- | ---- |
| Greenville, *C. O. Jenison, M D.* | 47 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | ---- | 4 | 4 | 5 | 4 |
| Hastings, *F. R. Timmerman, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | -- | ---- | ---- | ---- | ---- | ---- |
| Hastings, *G. W. Lowry, M. D.* | 34 | ---- | ---- | ---- | ---- | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| Hamburg, *J. N. Swartz, M. D.* | 34 | ---- | ---- | ---- | ---- | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Howard City, *Truman Sawdy, M. D.* | 12 | 4 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Howell, *Alex. O'Neil, M. D.* | 18 | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 3 | 3 | 4 | 4 | ---- |
| Ionia, *J. G. Connor, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Ionia, *H. Tremayne, M. D.* | 9 | ---- | ---- | ---- | 3 | 4 | 2 | ---- | ---- | ---- | ---- | ---- | ---- |
| Lakeview, *A. H. Forsyth, M. D.* | 37 | 4 | 4 | 5 | 4 | 5 | 4 | ---- | ---- | ---- | 2 | 5 | 4 |
| Leslie, *H. W. Bartlett, M. D.* | 7 | 3 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Lyons, *B. M. Hutchinson, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Maple Rapids, *David Hollister, M. D.* | 13 | ---- | ---- | ---- | 3 | 4 | 2 | ---- | ---- | ---- | 4 | -- | ---- |
| Morrice, *F. N. Jeffery, M. D.* | 38 | 4 | 3 | 3 | 4 | 3 | 4 | 3 | 5 | 2 | ---- | 5 | 2 |
| Mt. Morris, *H. W. Graham, M. D.* | 36 | ---- | ---- | ---- | 2 | 5 | 3 | 4 | 5 | 4 | 4 | 5 | 4 |
| Nashville, *R. P. Comfort, M. D.* | 12 | 4 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Nashville, *Wm. H. Young, M. D.* | 28 | ---- | ---- | ---- | 2 | ---- | ---- | 4 | 5 | 4 | 4 | 5 | 4 |
| Olivet, *J. S. Newland, M. D.* | 18 | ---- | ---- | ---- | ---- | 5 | 4 | 3 | ---- | 2 | ---- | ---- | 4 |
| Ovid, *Jas. E. Taylor, M. D.* | 29 | ---- | ---- | ---- | ---- | ---- | 4 | 4 | 5 | 3 | 4 | 5 | 4 |
| Perry, *H. W. Cobb, M. D.* | 35 | ---- | ---- | ---- | 2 | 3 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Perrinton, *G. Burton Wade, M. D.* | 16 | ---- | ---- | ---- | ---- | ---- | ---- | - | ---- | 4 | 3 | 5 | 4 |
| Potterville, *E. R. Espie, M. D.* | 50 | 4 | 4 | 4 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| Saranac, *Charles Wunch, M. D.* | 41 | 4 | 3 | 5 | 4 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | ---- |
| Sheridan, *C. F. Messmore* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Sheridan, *R. H. Blaisdell, M. D.* | 30 | ---- | ---- | ---- | 2 | 4 | 2 | 2 | 3 | 4 | 4 | 5 | 4 |
| Stanton, *W. P. Gamber, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Stanton, *Allen L. Corey, M. D.* | 11 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | -- | 2 | 2 | 3 | 4 |
| Stockbridge, *Geo. A. Rowe, M. D.* | 35 | 3 | 4 | 4 | 4 | 5 | 2 | 4 | 5 | 4 | ---- | ---- | ---- |
| St. Johns, *Martin Weller, M. D.* | 11 | 4 | 4 | 3 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Vermontville, *Wm. Parmenter, M. D.* | 27 | ---- | ---- | ---- | ---- | ---- | 2 | 3 | 5 | 4 | 4 | 5 | 4 |
| Westphalia, *F. W. Martin, M. D.* | 24 | 4 | 2 | ---- | 3 | ---- | 3 | 4 | --- | ---- | 2 | 4 | 2 |
| Williamston, *G. H. Brett, M. D.* | 25 | ---- | ---- | ---- | ---- | ---- | 4 | 4 | 5 | 4 | 4 | 4 | ---- |
| Woodland, *D. B. Kilpatrick, M. D.* | 25 | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 5 | 3 | 4 | 5 | 4 |

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* For counties in each division see Exhibit I, page 87.

## EXHIBIT V.—CONCLUDED.

| Divisions and localities represented and physicians who reported. (Health Officers in Italics.) | Weekly Reports in 1893.—Compiled in this Article. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year, 1893. | Jan. | Feb. | Mar. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
| Southwestern Division* | 778 | 50 | 46 | 62 | 63 | 89 | 68 | 71 | 80 | 59 | 58 | 74 | 58 |
| Allegan, *Wm. Albright, M. D.* | 28 | 4 | ---- | 3 | 4 | 5 | 3 | 4 | 5 | ---- | ---- | ---- | ---- |
| Bangor, *Lu C. Harrison, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Benton Harbor, *Wakeman Ryno, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Buchanan, *M. M. Knight, M. D.* | 32 | 4 | 4 | 5 | 4 | 5 | 4 | 2 | 4 | ---- | ---- | ---- | ---- |
| Decatur, *James E. Maxwell, M. D.* | 50 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 3 | 4 | 5 | 4 |
| Douglas, *Harley A. Stroud, M. D.* | 48 | 4 | 2 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 3 |
| Dowagiac, *Wm. E. Parker, M. D.* | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 2 | 3 | ---- | ---- |
| Fennville, *G. W. Forrest, M. D.* | 37 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 2 | ---- | ---- | ---- |
| Fennville, *Wm. H. Andrews, M. D.* | 18 | ---- | ---- | ---- | ---- | ---- | ---- | 3 | ---- | 3 | 4 | 5 | 3 |
| Hartford, *H. C. Maynard, M. D.* | 51 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Hartford, *E. A. Palmer, M. D.* | 19 | ---- | ---- | ---- | ---- | 4 | 4 | 4 | 5 | 2 | ---- | ---- | ---- |
| Lawton, *F. A. Phillips, M. D.* | 16 | ---- | ---- | ---- | 4 | 5 | 3 | 4 | ---- | ---- | ---- | ---- | ---- |
| Lawrence, *O. B. Wiggins, M. D.* | 36 | ---- | ---- | ---- | 2 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Marcellus, *Fred Shillito, M. D.* | 11 | ---- | ---- | ---- | 2 | ---- | ---- | ---- | ---- | ---- | ---- | 5 | 4 |
| New Buffalo, *F. M. Gowdy, M. D.* | 10 | 2 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Niles, *Jno. D. Greenamyer, M. D.* | 30 | ---- | ---- | ---- | ---- | 4 | 3 | 3 | 4 | 4 | 3 | 5 | 4 |
| Otsego, *M. Chase, M. D.* | 50 | 4 | 4 | 5 | 4 | 5 | 4 | 3 | 4 | 4 | 4 | 5 | 4 |
| Saugatuck, *H. M. Stimson, M. D.* | 50 | 4 | 4 | 5 | 3 | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 4 |
| South Haven, *W. B. Anderson, M. D.* | 38 | ---- | ---- | ---- | 3 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| St. Joseph, *John W. Doyle, M. D.* | 7 | ---- | ---- | ---- | 2 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Vandalia, *S. A. Work, M. D.* | 17 | 4 | 4 | 5 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Vandalia, *Leander Osborn, M. D.* | 34 | ---- | ---- | ---- | 3 | 4 | 3 | 4 | 5 | 3 | 4 | 4 | 4 |
| Watervliet, *W. L. Garratt, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Wayland, *J. C. Branch, M. D.* | 35 | ---- | ---- | ---- | ---- | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Southern Central Division* | 1,317 | 118 | 114 | 131 | 90 | 113 | 90 | 97 | 129 | 105 | 104 | 127 | 99 |
| Adrian, *Frank E. Andrews, M. D.* | 5 | ---- | ---- | ---- | ---- | 3 | 2 | ---- | ---- | ---- | ---- | ---- | ---- |
| Brooklyn, *E. N. Palmer, M. D.* | 44 | 4 | 4 | 5 | 4 | 4 | 2 | 3 | 3 | 4 | 3 | 5 | 3 |
| Bronson, *Levi Saunders, M. D.* | 49 | 3 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 3 | 4 | 4 |
| Burr Oak, *J. C. Rollman, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Burr Oak, *C. D. Parsons, M. D.* | 51 | 4 | 4 | 5 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| Clayton, *James McDonald, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Clinton, *John L. Tuttle, M. D.* | 42 | 4 | ---- | 5 | 3 | 3 | 2 | 4 | 5 | 4 | 4 | 5 | 3 |
| Coldwater, *W. L. Ford, M. D.* | 43 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | ---- | ---- |
| Concord, *W. N. Keeler, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Constantine, *Daniel E. Thomas, M. D.* | 8 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Constantine, *Bela P. Scoville, M. D.* | 25 | ---- | ---- | ---- | ---- | ---- | ---- | 3 | 5 | 4 | 4 | 5 | 4 |
| Deerfield, *Webster Bliss, M. D.* | 51 | 4 | 3 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Galesburg, *O. F. Burroughs, M. D.* | 31 | ---- | ---- | ---- | ---- | 5 | 4 | 4 | 5 | 2 | 3 | 5 | 3 |
| Galesburg, *Wm. L. McBeth, M. D.* | 7 | 3 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Grass Lake, *H. J. Hale, M. D.* | 6 | 2 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Hanover, *A. L. Ambrose, M. D.* | 14 | 3 | 3 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Kalamazoo, H. H. Schaberg, M. D. | 36 | 4 | ---- | 4 | 3 | 3 | 4 | ---- | 3 | 4 | 3 | 4 | 4 |
| Kalamazoo, W. B. Southard, M. D. | 50 | 4 | 4 | 3 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Kalamazoo, *C. Vanzwaluwenberg, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Kalamazoo, *A. Hochstein, M. D.* | 35 | ---- | ---- | ---- | ---- | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Litchfield, *George Martin, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Litchfield, *J. O. Spinning, M. D.* | 34 | ---- | ---- | ---- | ---- | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Manchester, *T. L. Iddings, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Manchester, *E. M. Conklin, M. D.* | 37 | ---- | ---- | ---- | 2 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Marshall, *L. S. Joy, M. D.* | 51 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 3 | 4 | 5 | 4 |
| Mendon, H. C. Clapp, M. D. | 49 | 4 | 4 | 5 | 4 | 4 | 3 | 4 | 5 | 4 | 4 | 5 | 3 |
| Mendon, *Edwin Stewart, M. D.* | 47 | 4 | 4 | 5 | 4 | 5 | 4 | ---- | 5 | 4 | 4 | 4 | 4 |
| Morenci, *Samuel Stevenson, M. D.* | 17 | 4 | 4 | 5 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Parma, *E. V. Riker, M. D.* | 11 | 4 | 4 | 3 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Richland, *J. M. Rankin, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Saline, *C. F. Unterkircher, M. D.* | 11 | 4 | 4 | 3 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Sherwood, *C. E. Nelthorp, M. D.* | 33 | ---- | ---- | ---- | 2 | 4 | 2 | 4 | 4 | 4 | 4 | 5 | 4 |
| Springport, *J. B. Judson, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Sturgis, *S. B. Follett, M. D.* | 35 | ---- | ---- | ---- | ---- | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Tecumseh, J. F. Jenkins, M. D. | 51 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 3 |
| Tecumseh, *C. M. Woodward, M. D.* | 19 | 3 | 4 | 5 | 4 | 3 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Tecumseh, *T. O. Tefft, M. D.* | 28 | ---- | ---- | ---- | ---- | ---- | 3 | 4 | 4 | 4 | 4 | 5 | 4 |
| Tekonsha, *John L. Ramsdell, M. D.* | 26 | ---- | ---- | ---- | ---- | ---- | ---- | 4 | 5 | 4 | 4 | 5 | 4 |
| Vicksburg, *C. H. McKain, M. D.* | 43 | 4 | 4 | 5 | 4 | ---- | ---- | 4 | 5 | 4 | 4 | 5 | 4 |
| White Pigeon, *J. P. Siegfried, M. D.* | 12 | 4 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Ypsilanti, *D. A. Post, M. D.* | 17 | 4 | 4 | 5 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Southeastern Division* | 427 | 36 | 36 | 42 | 28 | 39 | 34 | 30 | 38 | 35 | 34 | 43 | 32 |
| Armada, *S. T. Beardslee, M. D.* | 31 | ---- | ---- | ---- | 2 | 5 | 4 | 3 | 5 | 4 | 3 | 5 | ---- |
| Highland Park, *A. Stewart, M. D.* | 51 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 3 | 5 | 4 |
| Memphis, *D. H. Cole, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Memphis, *A. B. House, M. D.* | 32 | ---- | ---- | ---- | ---- | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| New Haven, *Alex. Gunn, M. D.* | 52 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Northville, *M. A. Patterson, M. D.* | 12 | 4 | 4 | 4 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Plymouth, *J. M. Collier, M. D.* | 6 | ---- | ---- | ---- | 4 | ---- | 2 | ---- | ---- | ---- | ---- | ---- | ---- |
| Richmond, *W. D. Clark, M. D.* | 13 | 4 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Romeo, *J. B. Fares, M. D.* | 51 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Romeo, *Wm. Greenshields, M. D.* | 36 | ---- | ---- | ---- | 2 | 5 | 4 | 3 | 5 | 4 | 4 | 5 | 4 |
| Royal Oak, *E. A. Kidder, M. D.* | 22 | 4 | 4 | 5 | 4 | 5 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Trenton, *Hiram Holden, M. D.* | 42 | 4 | 4 | 4 | ---- | ---- | 4 | 4 | 5 | 4 | 4 | 5 | 4 |
| Warren, *J. C. Flynn, M. D.* | 16 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 3 | 4 | 5 | 4 |
| Wayne, *H. E. Foster, M. D.* | 50 | 4 | 4 | 5 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

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* For counties in each division see Exhibit I, page 87.

TABLE 1.—*Stating, for each of the Thirteen Years, 1881–1893, and the average for 1877–1892, also the Average for the period of seven years, 1886–1892, by what Per Cent of Observers each of 28 Diseases was reported present in those years (also the Average Number of Observers per Month and the Total Observers for each Year).—Compiled from Weekly Reports of Health Officers of Cities and Villages and from Regular Correspondents of the State Board of Health,*—Diseases arranged in order of Greatest Number of Observers reporting them present in 1893.—(Continued for each month of 1892 and 1893, on pages 98–99.)*

| Line Number. | Diseases. | Observers by whom the Several Diseases were Reported Present.—Average Per Cents (per Month) of those making Reports.† | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Av. 1877-92. | Av. 1886-92. | 1893. | 1892. | 1891. | 1890. | 1889. | 1888. | 1887. | 1886. | 1885. | 1884. | 1883. | 1882. | 1881. |
| | Av. for tabulated diseases reported pres. | 39 | 36 | 31 | 33 | 37 | 37 | 36 | 35 | 37 | 37 | 38 | 42 | 43 | 43 | 45 |
| 1 | Rheumatism | 83 | 81 | 80 | 83 | 86 | 87 | 82 | 82 | 82 | 85 | 83 | 83 | 83 | 85 | 84 |
| 2 | Neuralgia ‡ | 82 | 82 | 76 | 80 | 83 | 85 | 82 | 79 | 83 | 83 | 83 | 84 | 85 | 85 | 78 |
| 3 | Bronchitis | 75 | 74 | 72 | 73 | 75 | 81 | 75 | 74 | 69 | 71 | 70 | 74 | 79 | 80 | 74 |
| 4 | Tonsillitis ‡ | 70 | 70 | 71 | 71 | 74 | 75 | 71 | 64 | 68 | 70 | 72 | 73 | 73 | 72 | 65 |
| 5 | Diarrhea | 65 | 65 | 61 | 63 | 67 | 68 | 65 | 60 | 65 | 64 | 66 | 71 | 67 | 69 | 67 |
| 6 | Influenza | 54 | 54 | 57 | 56 | 69 | 67 | 49 | 46 | 46 | 48 | 47 | 53 | 56 | 55 | 48 |
| 7 | Consumption, Pul ‡ | 67 | 59 | 47 | 49 | 60 | 62 | 59 | 57 | 60 | 64 | 68 | 72 | 71 | 74 | 78 |
| 8 | Pneumonia | 52 | 47 | 37 | 43 | 40 | 50 | 47 | 49 | 46 | 48 | 44 | 48 | 59 | 61 | 60 |
| 9 | Intermittent fever | 73 | 58 | 37 | 43 | 52 | 58 | 61 | 59 | 61 | 71 | 73 | 79 | 82 | 83 | 90 |
| 10 | Erysipelas | 42 | 41 | 29 | 34 | 39 | 43 | 43 | 44 | 44 | 43 | 44 | 48 | 47 | 42 | 42 |
| 11 | Inflam. of Kidney ‡ | 35 | 35 | 29 | 36 | 36 | 36 | 35 | 33 | 32 | 35 | 34 | 41 | ---- | ---- | ---- |
| 12 | Remittent Fever | 55 | 44 | 28 | 34 | 43 | 40 | 45 | 49 | 46 | 48 | 52 | 60 | 57 | 64 | 66 |
| 13 | Pleuritis ‡ | ---- | 34 | 27 | 35 | 36 | 35 | 33 | 32 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| 14 | Cholera Morbus | 31 | 30 | 26 | 29 | 31 | 29 | 27 | 29 | 33 | 29 | 33 | 37 | 32 | 31 | 41 |
| 15 | Inflam. of Bowels ‡ | 29 | 30 | 25 | 28 | 31 | 29 | 29 | 30 | 32 | 32 | 32 | 30 | 31 | 28 | 28 |
| 16 | Dysentery | 32 | 31 | 25 | 29 | 30 | 31 | 33 | 30 | 33 | 30 | 28 | 38 | 35 | 31 | 34 |
| 17 | Scarlet Fever | 25 | 18 | 19 | 22 | 17 | 18 | 18 | 17 | 15 | 20 | 22 | 29 | 32 | 32 | 32 |
| 18 | Cholera Infantum | 22 | 22 | 18 | 21 | 23 | 21 | 21 | 20 | 24 | 25 | 21 | 26 | 24 | 22 | 27 |
| 19 | Whooping-cough | 25 | 21 | 15 | 18 | 16 | 17 | 25 | 16 | 21 | 28 | 21 | 29 | 23 | 26 | 24 |
| 20 | Typhoid Fever (enteric) | 18 | 15 | 15 | 15 | 16 | 14 | 17 | 16 | 15 | 15 | 16 | 20 | 19 | 24 | 26 |
| 21 | Measles | 19 | 16 | 14 | 7 | 17 | 22 | 12 | 25 | 22 | 10 | 9 | 17 | 37 | 20 | 37 |
| 22 | Diphtheria | 28 | 16 | 13 | 15 | 13 | 16 | 12 | 14 | 18 | 24 | 27 | 27 | 31 | 43 | 51 |
| 23 | Typho-mal. Fever ‡ | 28 | 20 | 9 | 10 | 12 | 14 | 26 | 25 | 26 | 27 | 27 | 32 | 32 | 39 | 43 |
| 24 | Puerperal Fever | 12 | 11 | 9 | 11 | 8 | 9 | 13 | 12 | 14 | 12 | 13 | 16 | 15 | 18 | 12 |
| 25 | Inflam of Brain ‡ | 13 | 12 | 8 | 9 | 11 | 12 | 13 | 13 | 15 | 13 | 14 | 11 | 12 | 12 | 12 |
| 26 | Membranous Croup | 12 | 10 | 5 | 8 | 10 | 11 | 7 | 10 | 10 | 12 | 10 | 14 | 14 | 15 | 19 |
| 27 | Cerebro.spl. meningitis | 8 | 7 | 5 | 5 | 6 | 8 | 7 | 7 | 7 | 8 | 12 | 12 | 11 | 12 | 16 |
| 28 | Small-pox | 1.2 | 0.2 | 0.3 | .08 | 0 | 0.2 | 0.5 | .07 | .01 | 0.5 | 0.4 | 0.2 | 1 | 5 | 4 |
| | No. of Observers | 141 | 158 | 205 | 199 | 145 | 155 | 139 | 142 | 155 | 169 | 163 | 142 | 140 | 179 | 116 |
| | Av. No. of Observers per month | 89 | 104 | 113 | 109 | 91 | 102 | 100 | 102 | 114 | 113 | 104 | 79 | 88 | 93 | 70 |

* For 1893, the number of observers, reports, weeks in each month, etc., are stated in the first five columns of Exhibit III, page 90, the names of the observers and the number of the reports received from each are stated in Exhibit V, pages 94, 95 and 96. † ‡ Foot-notes are on page 103.

TABLE I.—Continued.- a*Per Cent of Observers by whom the Several Diseases were for the Period of seven years, 1886-1892, and*

Per Cent of Observers by whom the Diseases were Reported Present.‡

| Line number. | January.* | | | | | February.* | | | | | March.* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diseases. | Av.'77-'92. | Av.'86-'92. | 1893. | 1892. | Diseases. | Av.'77-'92. | Av.'86-'92. | 1893. | 1892. | Diseases. | Av.'77-'92. | Av.'86-'92. | 1893. | 1892. |
| | Average † | 40 | 37 | 31 | 37 | Average † | 39 | 36 | 30 | 35 | Average † | 40 | 37 | 32 | 36 |
| 1 | Tonsillitis | 80 | 79 | 85 | 78 | Bronchitis | 86 | 85 | 83 | 83 | Neuralgia | 87 | 87 | 88 | 83 |
| 2 | Rheumatism | 87 | 86 | 83 | 87 | Rheumatism | 85 | 84 | 82 | 84 | Rheumatism | 86 | 85 | 87 | 89 |
| 3 | Bronchitis | 85 | 82 | 79 | 86 | Neuralgia | 84 | 85 | 79 | 92 | Tonsillitis | 80 | 80 | 84 | 84 |
| 4 | Influenza | 72 | 73 | 72 | 98 | Tonsillitis | 78 | 78 | 77 | 78 | Bronchitis | 86 | 84 | 83 | 82 |
| 5 | Neuralgia | 84 | 85 | 75 | 88 | Influenza | 74 | 76 | 74 | 96 | Influenza | 75 | 80 | 78 | 95 |
| 6 | Pneumonia | 77 | 73 | 57 | 90 | Pneumonia | 78 | 74 | 54 | 77 | Pneumonia | 75 | 70 | 58 | 66 |
| 7 | Diarrhea | 47 | 48 | 52 | 46 | Consumption, Pul. | 68 | 61 | 48 | 52 | Consumption, Pul. | 70 | 63 | 52 | 51 |
| 8 | Consumption, Pul. | 68 | 63 | 41 | 57 | Diarrhea | 45 | 47 | 47 | 46 | Diarrhea | 49 | 51 | 44 | 56 |
| 9 | Pleuritis | -- | 47 | 33 | 54 | Erysipelas | 45 | 44 | 35 | 41 | Pleuritis | --- | 44 | 42 | 44 |
| 10 | Erysipelas | 47 | 44 | 33 | 40 | Pleuritis | --- | 46 | 35 | 55 | Inflam. of Kidney | 39 | 39 | 37 | 43 |
| 11 | Inflam. of Kidney | 35 | 33 | 32 | 39 | Inflam. of Kidney | 38 | 37 | 3 | 38 | Erysipelas | 47 | 47 | 33 | 52 |
| 12 | Intermittent Fever | 65 | 52 | 30 | 32 | Intermittent Fever | 65 | 52 | 24 | 38 | Intermittent Fever | 67 | 52 | 32 | 32 |
| 13 | Scarlet Fever | 32 | 23 | 28 | 23 | Measles | 20 | 19 | 28 | 7 | Inflam. of Bowels | 28 | 27 | 27 | 32 |
| 14 | Inflam. of Bowels | 26 | 27 | 18 | 30 | Scarlet Fever | 30 | 19 | 20 | 17 | Scarlet Fever | 32 | 22 | 23 | 30 |
| 15 | Diphtheria | 35 | 21 | 18 | 15 | Inflam. of Bowels | 25 | 26 | 19 | 17 | Remittent Fever | 48 | 38 | 22 | 23 |
| 16 | Remittent Fever | 48 | 38 | 18 | 18 | Remittent Fever | 31 | 36 | 19 | 19 | Measles | 26 | 25 | 21 | 8 |
| 17 | Measles | 17 | 15 | 18 | 5 | Whooping-cough | 23 | 18 | 15 | 13 | Dysentery | 15 | 14 | 17 | 20 |
| 18 | Dysentery | 15 | 15 | 15 | 14 | Diphtheria | 30 | 16 | 15 | 11 | Cholera morbus | 12 | 9 | 15 | 9 |
| 19 | Whooping-cough | 25 | 18 | 15 | 18 | Membran. Croup | 17 | 13 | 11 | 18 | Whooping-cough | 24 | 20 | 11 | 16 |
| 20 | Puerperal Fever | 13 | 12 | 12 | 13 | Cholera morbus | 10 | 7 | 11 | 9 | Membran. Croup | 15 | 12 | 10 | 9 |
| 21 | Cholera morbus | 9 | 8 | 10 | 5 | Dysentery | 12 | 13 | 10 | 14 | Diphtheria | 28 | 15 | 10 | 15 |
| 22 | Typhoid Fev. (ent.) | 16 | 11 | 10 | 14 | Puerperal Fever | 11 | 12 | 9 | 13 | Puerperal Fever | 14 | 14 | 9 | 15 |
| 23 | Cerebro-spi. men. | 7 | 6 | 10 | 5 | Inflam. of Brain | 14 | 14 | 8 | 9 | Inflam. of Brain | 15 | 15 | 8 | 9 |
| 24 | Typho-mal. Fever | 24 | 15 | 9 | 4 | Typhoid Fev. (ent.) | 12 | 8 | 6 | 7 | Typhoid Fev. (ent.) | 10 | 6 | 7 | 8 |
| 25 | Inflam. of Brain | 12 | 13 | 8 | 8 | Cerebro-spi. men. | 9 | 8 | 6 | 5 | Typho-mal. Fever | 18 | 12 | 4 | 2 |
| 26 | Membran. Croup | 21 | 16 | 6 | 15 | Cholera infantum | 4 | 4 | 4 | 7 | Cerebro-spi. men. | 11 | 10 | 3 | 6 |
| 27 | Cholera infantum | 5 | 4 | 8 | 2 | Typho-mal. Fever | 20 | 13 | 3 | 4 | Cholera infantum | 4 | 3 | 3 | 5 |
| 28 | Small-pox | 2 | 0.4 | 2 | 0 | Small-pox | 1 | 0.4 | 2 | 0 | Small-pox | 1 | 0.3 | 1 | 0 |
| | Observers § | 85 | 96 | 126 | 93 | Observers § | 86 | 97 | 124 | 103 | Observers § | 85 | 95 | 115 | 96 |

| Line number. | April.* | | | | | May.* | | | | | June.* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diseases. | Av.'77-'92. | Av.'86-'92. | 1893. | 1892. | Diseases. | Av.'77-'92. | Av.'86-'92. | 1893. | 1892. | Diseases. | Av.'77-'92. | Av.'86-'92. | 1893. | 1892. |
| | Average † | 40 | 37 | 30 | 34 | Average † | 39 | 36 | 32 | 31 | Average † | 37 | 35 | 28 | 32 |
| 1 | Rheumatism | 88 | 88 | 85 | 85 | Rheumatism | 86 | 86 | 85 | 82 | Rheumatism | 84 | 84 | 78 | 82 |
| 2 | Bronchitis | 83 | 82 | 83 | 78 | Bronchitis | 77 | 76 | 82 | 69 | Neuralgia | 80 | 79 | 67 | 76 |
| 3 | Neuralgia | 86 | 86 | 82 | 82 | Neuralgia | 83 | 83 | 78 | 79 | Bronchitis | 69 | 70 | 63 | 73 |
| 4 | Tonsillitis | 76 | 77 | 75 | 76 | Tonsillitis | 72 | 72 | 75 | 71 | Tonsillitis | 65 | 64 | 59 | 73 |
| 5 | Influenza | 67 | 70 | 66 | 67 | Influenza | 55 | 57 | 58 | 45 | Diarrhea | 65 | 64 | 57 | 61 |
| 6 | Consumption, Pul. | 71 | 64 | 56 | 49 | Diarrhea | 55 | 53 | 56 | 52 | Consumption, Pul. | 66 | 59 | 43 | 45 |
| 7 | Diarrhea | 50 | 49 | 50 | 45 | Consumption, Pul. | 70 | 62 | 56 | 49 | Intermittent Fever | 77 | 60 | 39 | 43 |
| 8 | Pneumonia | 72 | 66 | 48 | 57 | Intermittent Fever | 76 | 59 | 45 | 42 | Remittent Fever | 54 | 41 | 34 | 35 |
| 9 | Erysipelas | 47 | 46 | 37 | 38 | Pneumonia | 61 | 55 | 42 | 44 | Influenza | 41 | 41 | 34 | 87 |
| 10 | Intermittent Fever | 73 | 57 | 36 | 42 | Erysipelas | 47 | 45 | 41 | 35 | Erysipelas | 42 | 42 | 33 | 34 |
| 11 | Inflam. of Kidney | 40 | 40 | 34 | 48 | Inflam. of Kidney | 39 | 39 | 39 | 45 | Inflam. of Kidney | 37 | 37 | 32 | 37 |
| 12 | Pleuritis | --- | 45 | 30 | 40 | Remittent Fever | 53 | 40 | 34 | 26 | Cholera morbus | 36 | 31 | 29 | 33 |
| 13 | Inflam. of Bowels | 25 | 25 | 22 | 21 | Measles | 35 | 30 | 33 | 11 | Inflam. of Bowels | 29 | 30 | 27 | 35 |
| 14 | Remittent Fever | 51 | 40 | 20 | 27 | Pleuritis | --- | 36 | 28 | 39 | Pneumonia | 40 | 34 | 24 | 80 |
| 15 | Scarlet Fever | 31 | 22 | 20 | 32 | Scarlet Fever | 27 | 19 | 25 | 26 | Measles | 30 | 26 | 21 | 15 |
| 16 | Measles | 32 | 29 | 20 | 12 | Inflam. of Bowels | 28 | 30 | 23 | 28 | Pleuritis | --- | 30 | 21 | 29 |
| 17 | Whooping-cough | 24 | 22 | 15 | 19 | Whooping-cough | 26 | 23 | 18 | 17 | Cholera infantum | 21 | 19 | 19 | 13 |
| 18 | Diphtheria | 26 | 14 | 11 | 21 | Diphtheria | 23 | 15 | 17 | 15 | Scarlet Fever | 23 | 16 | 19 | 21 |
| 19 | Puerperal Fever | 12 | 14 | 10 | 20 | Cholera morbus | 19 | 17 | 14 | 17 | Whooping-cough | 25 | 21 | 19 | 17 |
| 20 | Inflam. of Brain | 14 | 13 | 8 | 9 | Dysentery | 18 | 19 | 11 | 14 | Dysentery | 24 | 22 | 17 | 28 |
| 21 | Cholera morbus | 13 | 10 | 8 | 11 | Puerperal Fever | 12 | 12 | 10 | 8 | Diphtheria | 22 | 12 | 16 | 12 |
| 22 | Dysentery | 15 | 14 | 8 | 16 | Typhoid Fev. (ent.) | 8 | 6 | 8 | 8 | Puerperal Fever | 12 | 11 | 11 | 10 |
| 23 | Typho-mal. Fever | 18 | 14 | 6 | 3 | Inflam. of Brain | 13 | 12 | 7 | 11 | Inflam. of Brain | 13 | 13 | 10 | 12 |
| 24 | Membran. Croup | 13 | 11 | 6 | 7 | Cerebro-spi. men. | 10 | 8 | 7 | 5 | Typhoid Fev. (ent.) | 9 | 8 | 10 | 9 |
| 25 | Cholera infantum | 4 | 4 | 4 | 5 | Cholera infantum | 8 | 9 | 6 | 7 | Cerebro-spi. men. | 8 | 6 | 7 | 6 |
| 26 | Typhoid Fev. (ent.) | 9 | 6 | 4 | 7 | Membran. Croup | 10 | 9 | 5 | 5 | Typho-mal. Fever | 19 | 13 | 5 | 11 |
| 27 | Cerebro-spi. men. | 11 | 7 | 8 | 8 | Typho-mal. Fever | 18 | 14 | 4 | 5 | Membran. Croup | 7 | 5 | 1 | 3 |
| 28 | Small-pox | 2 | 0.1 | 1 | 0 | Small-pox | 2 | 0.8 | 0 | 1 | Small-pox | 2 | 0.1 | 1 | 0 |
| | Observers § | 79 | 88 | 114 | 91 | Observers § | 87 | 100 | 115 | 95 | Observers § | 89 | 102 | 123 | 94 |

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a For first part of Table 1, and full heading, see page 97.

* For 1893 the number of observers, reports, weeks in each month, etc., are stated in the first five col- stated in Exhibit V., pages 91-96. † The numbers in this line are an average, not for all diseases repre-

*Reported Present by Months in each of the years 1892–1893, and the Average by Months for the Period of sixteen years, 1877–1892.*

| Per Cent of Observers by whom the Diseases were Reported Present.‡ | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| July.* | | | | | August.* | | | | | September.* | | | | | |
| Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Line number. |
| Average † | 40 | 38 | 29 | 32 | Average † | 42 | 40 | 34 | 37 | Average † | 43 | 39 | 31 | 36 | |
| Diarrhea | 89 | 87 | 78 | 79 | Diarrhea | 93 | 94 | 90 | 87 | Diarrhea | 93 | 89 | 86 | 88 | 1 |
| Rheumatism | 76 | 81 | 76 | 78 | Rheumatism | 75 | 76 | 79 | 81 | Rheumatism | 77 | 80 | 74 | 78 | 2 |
| Neuralgia | 79 | 80 | 73 | 76 | Neuralgia | 75 | 77 | 73 | 76 | Neuralgia | 67 | 79 | 66 | 75 | 3 |
| Tonsillitis | 56 | 57 | 63 | 62 | Cholera morbus | 76 | 74 | 69 | 63 | Cholera morbus | 63 | 61 | 59 | 61 | 4 |
| Bronchitis | 60 | 61 | 57 | 58 | Tonsillitis | 55 | 56 | 66 | 60 | Dysentery | 69 | 66 | 59 | 62 | 5 |
| Consumption, Pul. | 64 | 56 | 48 | 49 | Dysentery | 73 | 69 | 57 | 55 | Bronchitis | 63 | 65 | 57 | 66 | 6 |
| Cholera morbus | 68 | 64 | 47 | 51 | Cholera infantum | 66 | 65 | 55 | 55 | Tonsillitis | 59 | 59 | 55 | 57 | 7 |
| Intermittent Fever | 79 | 65 | 45 | 47 | Bronchitis | 57 | 59 | 54 | 61 | Cholera infantum | 57 | 55 | 53 | 52 | 8 |
| Cholera infantum | 48 | 48 | 31 | 35 | Intermittent Fever | 80 | 65 | 49 | 54 | Consumption, Pul. | 62 | 54 | 43 | 49 | 9 |
| Remittent Fever | 59 | 47 | 30 | 39 | Consumption, Pul. | 63 | 57 | 48 | 50 | Intermittent Fever | 79 | 63 | 40 | 52 | 10 |
| Inflam. of Kidney | 35 | 34 | 30 | 34 | Inflam. of Bowels | 37 | 39 | 46 | 38 | Remittent Fever | 65 | 51 | 34 | 46 | 11 |
| Inflam. of Bowels | 34 | 34 | 29 | 25 | Remittent Fever | 64 | 51 | 38 | 47 | Influenza | 42 | 39 | 34 | 38 | 12 |
| Erysipelas | 39 | 37 | 29 | 30 | Influenza | 32 | 29 | 28 | 30 | Typhoid Fev. (ent.) | 30 | 29 | 28 | 24 | 13 |
| Dysentery | 50 | 46 | 24 | 25 | Inflam. of Kidney | 32 | 32 | 22 | 38 | Inflam. of Bowels | 32 | 34 | 27 | 33 | 14 |
| Influenza | 31 | 30 | 23 | 25 | Typhoid Fev. (ent.) | 23 | 23 | 21 | 20 | Inflam. of Kidney | 28 | 27 | 22 | 25 | 15 |
| Pleuritis | ... | 23 | 21 | 21 | Whooping-cough | 29 | 25 | 20 | 26 | Erysipelas | 33 | 34 | 19 | 25 | 16 |
| Whooping-cough | 29 | 25 | 20 | 21 | Erysipelas | 35 | 36 | 20 | 28 | Pneumonia | 29 | 25 | 19 | 24 | 17 |
| Measles | 22 | 17 | 17 | 8 | Typho-mal. Fever | 35 | 27 | 19 | 17 | Pleuritis | ... | 23 | 18 | 23 | 18 |
| Pneumonia | 29 | 38 | 17 | 18 | Diphtheria | 22 | 12 | 16 | 12 | Typho-mal. Fever | 47 | 34 | 17 | 15 | 19 |
| Scarlet Fever | 20 | 13 | 13 | 16 | Scarlet Fever | 18 | 12 | 16 | 16 | Whooping-cough | 26 | 22 | 14 | 19 | 20 |
| Diphtheria | 21 | 11 | 13 | 8 | Pleuritis | ... | 20 | 15 | 25 | Scarlet Fever | 19 | 14 | 13 | 16 | 21 |
| Typhoid Fev. (ent.) | 13 | 13 | 12 | 13 | Pneumonia | 24 | 21 | 15 | 16 | Diphtheria | 25 | 15 | 11 | 11 | 22 |
| Puerperal Fever | 11 | 10 | 9 | 11 | Inflam. of Brain | 14 | 13 | 9 | 10 | Puerperal Fever | 10 | 9 | 9 | 7 | 23 |
| Inflam. of Brain | 13 | 14 | 7 | 14 | Puerperal Fever | 10 | 9 | 7 | 9 | Cerebro-spi. men. | 8 | 6 | 6 | 2 | 24 |
| Typho-mal. Fever | 23 | 17 | 6 | 10 | Measles | 11 | 9 | 6 | 5 | Inflam. of Brain | 12 | 11 | 5 | 10 | 25 |
| Cerebro-spi. men. | 8 | 8 | 4 | 6 | Membran. Croup | 5 | 4 | 4 | 3 | Measles | 8 | 6 | 2 | 3 | 26 |
| Membran. Croup | 4 | 4 | 1 | 4 | Cerebro-spi. men. | 8 | 7 | 3 | 6 | Membran. Croup | 8 | 6 | 1 | 4 | 27 |
| Small-pox | 2 | 0.1 | 0 | 0 | Small-pox | 1 | 0.1 | 0 | 0 | Small-pox | 1 | 0.3 | 0 | 0 | 28 |
| Observers § | 93 | 108 | 126 | 126 | Observers § | 97 | 112 | 121 | 129 | Observers § | 96 | 112 | 125 | 122 | |

| October.* | | | | | November.* | | | | | December.* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Diseases. | Av. '77–'92. | Av. '86–'92. | 1893. | 1892. | Line number. |
| Average † | 42 | 38 | 30 | 34 | Average † | 39 | 35 | 32 | 34 | Average † | 39 | 36 | 28 | 34 | |
| Rheumatism | 84 | 85 | 79 | 80 | Influenza | 56 | 55 | 86 | 59 | Influenza | 64 | 68 | 98 | 73 | 1 |
| Diarrhea | 78 | 76 | 79 | 76 | Bronchitis | 78 | 76 | 80 | 76 | Rheumatism | 86 | 87 | 78 | 87 | 2 |
| Neuralgia | 81 | 81 | 73 | 75 | Rheumatism | 84 | 85 | 78 | 83 | Neuralgia | 84 | 83 | 78 | 82 | 3 |
| Bronchitis | 78 | 72 | 70 | 70 | Neuralgia | 82 | 82 | 78 | 80 | Bronchitis | 83 | 81 | 77 | 82 | 4 |
| Tonsillitis | 69 | 71 | 67 | 68 | Tonsillitis | 77 | 77 | 77 | 79 | Tonsillitis | 80 | 80 | 74 | 80 | 5 |
| Dysentery | 41 | 41 | 48 | 42 | Diarrhea | 62 | 56 | 54 | 50 | Pneumonia | 63 | 57 | 50 | 49 | 6 |
| Intermittent Fever | 78 | 63 | 43 | 47 | Pneumonia | 51 | 44 | 52 | 43 | Consumption, Pul. | 66 | 58 | 45 | 50 | 7 |
| Influenza | 47 | 46 | 42 | 37 | Consumption, Pul. | 65 | 56 | 47 | 45 | Diarrhea | 48 | 49 | 39 | 52 | 8 |
| Consumption, Pul. | 66 | 56 | 41 | 44 | Remittent Fever | 56 | 44 | 39 | 40 | Pleuritis | ... | 42 | 35 | 41 | 9 |
| Typhoid Fev. (ent.) | 33 | 30 | 32 | 26 | Intermittent Fever | 72 | 57 | 36 | 45 | Erysipelas | 42 | 42 | 30 | 30 | 10 |
| Remittent Fever | 64 | 52 | 31 | 44 | Typhoid Fev. (ent.) | 28 | 24 | 29 | 22 | Intermittent Fever | 66 | 51 | 23 | 34 | 11 |
| Cholera infantum | 26 | 24 | 30 | 34 | Inflam. of Kidney | 33 | 33 | 27 | 32 | Inflam. of Kidney | 35 | 34 | 21 | 30 | 12 |
| Inflam. of Bowels | 30 | 30 | 27 | 26 | Pleuritis | ... | 33 | 27 | 34 | Scarlet Fever | 28 | 23 | 21 | 25 | 13 |
| Cholera morbus | 32 | 30 | 25 | 36 | Erysipelas | 41 | 42 | 25 | 31 | Remittent Fever | 51 | 41 | 20 | 33 | 14 |
| Erysipelas | 40 | 39 | 28 | 27 | Dysentery | 23 | 22 | 23 | 25 | Inflam. of Bowels | 29 | 30 | 18 | 22 | 15 |
| Pneumonia | 38 | 35 | 22 | 29 | Inflam. of Bowels | 27 | 26 | 21 | 22 | Whooping-cough | 22 | 16 | 16 | 13 | 16 |
| Inflam. of Kidney | 35 | 33 | 20 | 35 | Cholera morbus | 15 | 14 | 19 | 17 | Typhoid Fev. (ent.) | 21 | 17 | 13 | 18 | 17 |
| Pleuritis | ... | 29 | 20 | 27 | Scarlet Fever | 24 | 18 | 18 | 26 | Diphtheria | 35 | 21 | 11 | 23 | 18 |
| Scarlet Fever | 23 | 18 | 17 | 17 | Whooping-cough | 23 | 18 | 14 | 19 | Typho-mal. Fever | 28 | 17 | 8 | 13 | 19 |
| Typho-mal. Fever | 50 | 35 | 16 | 12 | Diphtheria | 35 | 21 | 13 | 18 | Inflam. of Brain | 12 | 12 | 7 | 8 | 20 |
| Whooping-cough | 23 | 18 | 9 | 13 | Typho-mal. Fever | 37 | 23 | 13 | 14 | Cholera morbus | 12 | 11 | 7 | 9 | 21 |
| Diphtheria | 33 | 20 | 9 | 17 | Puerperal Fever | 11 | 10 | 10 | 12 | Dysentery | 15 | 16 | 7 | 14 | 22 |
| Inflam. of Brain | 10 | 10 | 7 | 3 | Membran. Croup | 17 | 13 | 9 | 12 | Puerperal Fever | 11 | 11 | 5 | 8 | 23 |
| Puerperal Fever | 11 | 11 | 7 | 7 | Inflam. of Brain | 11 | 10 | 8 | 10 | Cerebro-spi. men. | 7 | 6 | 4 | 4 | 24 |
| Cerbro-spi. men. | 8 | 5 | 3 | 4 | Cholera infantum | 10 | 9 | 7 | 11 | Membran. Croup | 19 | 16 | 4 | 11 | 25 |
| Membran. Croup | 13 | 11 | 2 | 7 | Cerebro-spi. men. | 6 | 5 | 4 | 3 | Measles | 13 | 11 | 3 | 7 | 26 |
| Measles | 7 | 7 | 2 | 5 | Measles | 10 | 9 | 3 | 6 | Cholera infantum | 6 | 6 | 2 | 7 | 27 |
| Small-pox | 0.4 | 0.1 | 0 | 0 | Small-pox | 1 | 0.6 | 0 | 0 | Small-pox | 2 | 0.6 | 0 | 0 | 28 |
| Observers § | 95 | 109 | 123 | 121 | Observers § | 93 | 108 | 122 | 121 | Observers § | 91 | 104 | 121 | 122 | |

umns of Exhibit III., page 90, the names of observers and the number of reports received from each are sented, but only for those reported present in the given month. ‡ See foot-note with this mark on page 103.

§ The numbers in this line state how many observers reported for the month in the given year.

TABLE 2.—WEEKLY REPORTS OF DISEASES IN MICHIGAN IN 1893.—*Exhibiting for the Year and for each Month of the Year ending Saturday, December 30, 1893, a Summary relative to diseases in the State of Michigan; also for each Month a Summary relative to Diseases in each of 11 Geographical Divisions* of the State.—Indicating the prevalence as regards Time and Area. Compiled from 5,853 Weekly Reports by 205 Observers, Health Officers of Cities and Villages, Regular Correspondents of the State Board of Health, and other Physicians, Reporting the Diseases under their observation.*

| Number of Observers, Reports, etc. | Diseases. | (Av. b) Per Cent of Observers reporting Presence of. | Average Per Cent of Weeks Reported Present Where Present. c | Per Cent of Reports Stating Presence of. d | Average Order of Prevalence Where Present. e | Average Order of Prevalence where Present. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1892. | 1891. | 1890. | 1889. | 1888. | 1887. | 1886. | 1885. | 1884. | 1883. | 1882. | 1881. | Av. 1877–1892. | Av. 1886–1892. |
| Year Ending December 30, 1893.†<br>localities represented, 171.<br>localities represeted per month, 113.<br>observers during the year, 205.<br>observers per month, 121.<br>reports compiled, 5,853. a<br>reports per month, 488. | Average for tabulated diseases reported present. | 31 | 64 | 20 | 3.3 | 3.1 | 3.3 | 3.3 | 3.3 | 3.5 | 3.7 | 3.7 | 3.8 | 4.2 | 4.2 | 4.2 | 4.9 | 3.8 | 3.4 |
| | Brain, Inflammation of | 8 | 35 | 3 | 4.3 | 3.9 | 4.9 | 5.4 | 4.8 | 6.4 | 6.2 | 5.9 | 6.0 | 6.4 | 6.6 | 6.6 | 8.7 | 6.1 | 5.4 |
| | Bowels, Inflammation of | 25 | 46 | 12 | 4.0 | 4.1 | 4.3 | 4.4 | 4.1 | 4.6 | 5.0 | 5.0 | 5.1 | 5.8 | 6.1 | 6.0 | 7.4 | 5.3 | 4.5 |
| | Bronchitis | 72 | 73 | 53 | 2.5 | 2.6 | 2.7 | 2.6 | 2.7 | 2.7 | 3.0 | 3.0 | 3.1 | 3.2 | 3.2 | 3.3 | 3.9 | 3.1 | 2.8 |
| | Cerebro-spinal meningitis | 5 | 35 | 2 | 4.4 | 3.7 | 5.3 | 4.7 | 4.2 | 4.6 | 7.8 | 7.3 | 6.9 | 6.9 | 7.4 | 7.2 | 7.9 | 6.3 | 5.4 |
| | Cholera Infantum | 18 | 54 | 10 | 3.4 | 3.6 | 3.6 | 3.5 | 3.4 | 4.0 | 4.1 | 3.9 | 4.6 | 4.8 | 4.8 | 4.9 | 5.1 | 4.5 | 3.7 |
| | Cholera Morbus | 26 | 51 | 14 | 3.3 | 3.4 | 3.4 | 3.5 | 3.4 | 3.7 | 3.8 | 4.2 | 4.5 | 4.9 | 5.0 | 5.2 | 5.3 | 4.5 | 3.6 |
| | Consumption, Pulmonary | 47 | 80 | 33 | 3.5 | 3.7 | 3.8 | 3.5 | 3.5 | 3.6 | 3.7 | 3.9 | 4.0 | 4.3 | 4.5 | 4 6 | 5.6 | 4.4 | 3.7 |
| | Croup, Membraneous | 5 | 37 | 2 | 4.1 | 4.7 | 4.4 | 4.6 | 4.3 | 5.1 | 6.8 | 6.2 | 6.1 | 7.1 | 7.1 | 7.0 | 8.2 | 6.2 | 5.2 |
| | Diphtheria | 13 | 55 | 7 | 3.4 | 3.5 | 4.4 | 4.2 | 4.3 | 4.8 | 4.4 | 4.2 | 4.7 | 5.1 | 5.4 | 4.8 | 5.6 | 4.8 | 4.3 |
| | Diarrhea | 61 | 65 | 40 | 2.6 | 2.6 | 2.7 | 2.9 | 2.8 | 3.0 | 3.0 | 3.2 | 3.3 | 3.3 | 3.7 | 3.8 | 3.9 | 3.4 | 2.9 |
| | Dysentery | 25 | 54 | 13 | 3.6 | 3.8 | 3.8 | 3.8 | 3.7 | 3.8 | 4.3 | 4.5 | 5.0 | 5.0 | 5.2 | 5.3 | 5.1 | 4.8 | 4.0 |
| | Erysipelas | 29 | 47 | 14 | 3.9 | 4.1 | 4.2 | 4.1 | 4.1 | 4.4 | 4.7 | 4.5 | 4.6 | 5.2 | 5.5 | 5.5 | 6.2 | 5.1 | 4.3 |
| | Fever, Intermittent | 37 | 63 | 24 | 2.9 | 3.0 | 3.2 | 2.9 | 2.6 | 2.6 | 2.8 | 2.6 | 2.4 | 2.5 | 2.3 | 2.0 | 2.4 | 2.5 | 2.8 |
| | Fever, Remittent | 28 | 63 | 18 | 2.9 | 2.9 | 3.3 | 3.2 | 3.2 | 3.1 | 3.4 | 3.3 | 3.2 | 3.3 | 3.3 | 3.3 | 3.5 | 3.2 | 3.2 |
| | Fever, Typhoid (enteric) | 15 | 63 | 9 | 3.2 | 3.6 | 3.5 | 3.8 | 3.9 | 4.2 | 4.5 | 4.7 | 4.7 | 5.2 | 5.1 | 5.1 | 6.2 | 5.0 | 4.0 |
| | Fever, Typho-malarial | 9 | 47 | 4 | 3.6 | 3.7 | 3.6 | 3.6 | 3.9 | 3.6 | 4.1 | 4.2 | 4.4 | 4.6 | 4.8 | 4.9 | 5.2 | 4.5 | 3.8 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| For the | Whole number of<br>Average number of<br>Whole number of<br>Average number of<br>Total number of<br>Average number of | Influenza | 57 | 74 | 43 | 2.0 | 2.1 | 2.0 | 2.2 | 2.4 | 2.7 | 3.0 | 2.7 | 2.9 | 3.3 | 3.2 | 3.1 | 3.5 | 2.8 | 2.4 |
| | | Kidney, Inflammation of | 29 | 58 | 17 | 3.7 | 3.6 | 3.9 | 4.1 | 4.1 | 4.5 | 4.9 | 4.7 | 4.4 | 5.0 | ------ | ------ | ------ | 4.4 | 4.3 |
| | | Measles | 14 | 53 | 7 | 2.8 | 3.3 | 3.0 | 3.0 | 3.5 | 3.2 | 3.6 | 5.0 | 6.4 | 5.2 | 3.7 | 4.9 | 4.4 | 4.3 | 3.5 |
| | | Neuralgia | 76 | 74 | 57 | 2.5 | 2.5 | 2.8 | 2.7 | 2.6 | 2.7 | 2.8 | 2.8 | 2.8 | 3.3 | 3.3 | 3.6 | 4.3 | 3.2 | 2.7 |
| | | Pleuritis | 27 | 52 | 14 | 3.8 | 4.0 | 4.1 | 4.2 | 4.0 | 4.4 | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ |
| | | Pneumonia | 37 | 57 | 22 | 3.6 | 3.7 | 4.0 | 3.9 | 3.7 | 4.0 | 4.3 | 4.0 | 4.4 | 4.5 | 4.7 | 4.4 | 5.4 | 4.4 | 3.9 |
| | | Puerperal Fever | 9 | 38 | 3 | 3.8 | 4.1 | 4.5 | 4.5 | 8.4 | 4.6 | 5.7 | 5.9 | 6.3 | 6.9 | 7.3 | 6.2 | 8.2 | 5.9 | 4.7 |
| | | Rheumatism | 80 | 80 | 64 | 2.6 | 2.7 | 2.9 | 2.9 | 2.8 | 3.0 | 3.2 | 3.2 | 3.2 | 3.6 | 3.7 | 3.8 | 4.6 | 3.6 | 3.0 |
| | | Scarlatina | 19 | 54 | 10 | 3.6 | 3.2 | 4.2 | 4.2 | 3.9 | 4.6 | 5.0 | 4.5 | 5.0 | 5.2 | 5.2 | 4.9 | 6.7 | 4.9 | 4.2 |
| | | Small-pox | 0.3 | 46 | 0.2 | 4.8 | 5.0 | 0 | 6.5 | 11.0 | 15.3 | 26.0 | 25.9 | 8.4 | 26.0 | 14.0 | 9.1 | 8.9 | 11.5 | 12.8 |
| | | Tonsillitis | 71 | 67 | 49 | 2.8 | 2.9 | 3.3 | 3.4 | 3.3 | 3.4 | 3.4 | 3.4 | 3.5 | 3.7 | 3.9 | 3.9 | 4.5 | 3.7 | 3.3 |
| | | Whooping-cough | 15 | 57 | 9 | 3.0 | 3.0 | 2.9 | 3.2 | 3.3 | 3.9 | 4.2 | 3.7 | 4.1 | 4.5 | 5.2 | 4.4 | 6.3 | 4.3 | 3.5 |

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* For counties in each division see Exhibit I., page 87.

† For number of observers, reports, weeks in each month, etc., see Exhibit III., page 90; for names of observers, and number of reports received from each, see Exhibit V., pages 94, 95 and 96.

a Not every one of the observers sent in a report for every week, so that the number of reports received does not equal the number of observers multiplied by the number of weeks.

b The numbers in this column (pages 97–9) state not what per cent of the whole number of observers for the year reported the disease present at some time during the year, but the average (for the twelve months) of the per cents (of observers making reports for the several months) by which the disease was reported present in those months. The column for the year is thus a statement for an average *month*. But on pages 100 and 101 the numbers in the "Per Cent of Observers" column are statements for the month and not averages. This column indicates the area of prevalence except that in a few instances there were two or more observers in one city or village.

c This column states for the year or given month, what per cent the number of reports which stated a disease to be present is of the number of card-reports received, for the given time, from each of the observers as reported the diseases present. It is therefore an average not for all localities represented, but only for those at which the given disease was reported present. In the line "Average for Tabulated Diseases" it states what per cent the number of times *all* diseases were reported present is of the number of times they *might have been* so reported on the cards received, for the time specified, from the observers who during that time reported the diseases present (that is, if each of the observers had on every card he sent reported every disease present which he reported present at all). It will be seen that this is a more accurate average than would be obtained by dividing the sum of the column by the number of diseases reported present.

d This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from *all observers* in the State or division, as the case may be. It combines, and states in a general way, an idea of the *time* a disease was prevalent, with an idea of the area of its prevalence. Had every observer sent a report every week of the month or year, the numbers in this column would be (for the State) the product of the numbers in the same line in the two preceding columns.

e The disease having the greatest number of cases was to be marked 1 in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals (for the state) of the Order of Prevalence column, in Table 3 (a table giving statements for each locality, omitted in printing this Report, for want of room), by the number of men who reported the disease present. The column is, therefore, an average not for all the localities represented but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of men who reported the different diseases present, thus counting each man once for every disease he reported present. As a rule, small numbers in this column indicate a large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer from week to week, the greater will be the "Average" in this column.

TABLE 2.—CONTINUED.—*Diseases in the State, 1893. (For foot-notes and full tabular heads, see pages 100-101.)*

| Months.† | Diseases. | Per cent of Observers Reporting Presence of, b | Av. Per cent of Weeks Reported Present where Present, a, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Months.† | Per cent of Observers Reporting Presence of, b | Av. Per cent of Weeks Reported Present where Present, a, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Months.† | Per cent of Observers Reporting Presence of, b | Av. Per cent of Weeks Reported Present where Present, a, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Months.† | Per cent of Observers Reporting Presence of, b | Av. Per cent of Weeks Reported Present where Present, a, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Months.† | Per cent of Observers Reporting Presence of, b | Av. Per cent of Weeks Reported Present where Present, a, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Months.† | Per cent of Observers Reporting Presence of, b | Av. Per cent of Weeks Reported Present where Present, a, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January.† | Av. for Tab. Dis. Rep. Pres. | 31 | 65 | 21 | 3.1 | February.† | 30 | 67 | 21 | 2.9 | March.† | 32 | 64 | 20 | 3.0 | April.† | 30 | 66 | 20 | 3.1 | May † | 32 | 58 | 19 | 2.9 | June † | 28 | 61 | 18 | 2.8 |
| | Brain, Inflammation of | 8 | 37 | 3 | 4.9 | | 8 | 42 | 3 | 4.5 | | 8 | 38 | 8 | 3.8 | | 8 | 36 | 3 | 4.3 | | 7 | 29 | 2 | 3.4 | | 10 | 33 | 8 | 3.6 |
| | Bowels, Inflammation of | 18 | 43 | 8 | 3.8 | | 19 | 38 | 8 | 3.6 | | 27 | 41 | 11 | 4.6 | | 22 | 47 | 11 | 4.4 | | 23 | 34 | 8 | 3.7 | | 27 | 48 | 13 | 3.8 |
| | Bronchitis | 79 | 84 | 67 | 2.3 | | 83 | 82 | 67 | 2.2 | | 83 | 74 | 62 | 2.5 | | 83 | 76 | 64 | 2.2 | | 82 | 66 | 54 | 2.4 | | 63 | 64 | 42 | 2.5 |
| | Cerebro-spinal Meningitis | 10 | 38 | 4 | 4.6 | | 6 | 33 | 2 | 3.4 | | 3 | 31 | 1 | 3.7 | | 3 | 33 | 1 | 2.7 | | 7 | 29 | 2 | 2.6 | | 7 | 31 | 2 | 3.1 |
| | Cholera Infantum | 6 | 29 | 2 | 5.1 | | 4 | 25 | 1 | 3.6 | | 3 | 28 | 1 | 5.0 | | 4 | 31 | 1 | 5.8 | | 6 | 22 | 1 | 3.6 | | 19 | 48 | 9 | 3.3 |
| | Cholera Morbus | 10 | 31 | 4 | 3.8 | | 11 | 38 | 4 | 3.3 | | 15 | 38 | 5 | 3.8 | | 8 | 45 | 4 | 2.9 | | 14 | 28 | 4 | 4.5 | | 29 | 41 | 13 | 3.2 |
| | Consumption, Pulmonary | 41 | 85 | 35 | 3,7 | | 48 | 81 | 38 | 3.5 | | 52 | 82 | 43 | 3.6 | | 56 | 81 | 45 | 3.7 | | 56 | 77 | 43 | 3.2 | | 43 | 85 | 37 | 3.0 |
| | Croup, Membranous | 6 | 32 | 2 | 4.4 | | 11 | 43 | 5 | 3.6 | | 10 | 36 | 4 | 3.5 | | 6 | 39 | 2 | 3.4 | | 5 | 29 | 2 | 4.8 | | 1 | 25 | 0.2 | 5.0 |
| | Diphtheria | 18 | 55 | 10 | 3.5 | | 15 | 58 | 9 | 4.0 | | 10 | 55 | 6 | 4.5 | | 11 | 57 | 6 | 3.8 | | 17 | 51 | 8 | 2.3 | | 16 | 56 | 9 | 3.0 |
| | Diarrhea | 52 | 53 | 28 | 3.3 | | 47 | 53 | 25 | 3.3 | | 44 | 56 | 25 | 3.1 | | 50 | 57 | 29 | 3.1 | | 56 | 50 | 28 | 3.1 | | 57 | 62 | 36 | 2.6 |
| | Dysentery | 15 | 49 | 7 | 4.3 | | 10 | 47 | 5 | 4.2 | | 17 | 44 | 7 | 3.8 | | 8 | 47 | 4 | 5.2 | | 11 | 32 | 4 | 3.4 | | 17 | 48 | 9 | 3.4 |
| | Erysipelas | 33 | 44 | 14 | 4.3 | | 35 | 51 | 18 | 3.4 | | 33 | 46 | 15 | 3.8 | | 37 | 51 | 18 | 4.0 | | 41 | 41 | 17 | 3.9 | | 33 | 44 | 14 | 3.4 |
| | Fever, Intermittent | 30 | 61 | 19 | 3.4 | | 24 | 57 | 14 | 3.0 | | 32 | 55 | 18 | 3.4 | | 36 | 66 | 25 | 3.0 | | 45 | 56 | 26 | 2.8 | | 39 | 64 | 25 | 2.7 |
| | Fever, Remittent | 18 | 70 | 13 | 3.1 | | 19 | 64 | 13 | 2.8 | | 22 | 65 | 14 | 2.9 | | 20 | 67 | 14 | 3.3 | | 34 | 55 | 19 | 3.1 | | 34 | 62 | 21 | 2.6 |
| | Fever, Typhoid (enteric) | 10 | 62 | 6 | 3.2 | | 6 | 61 | 4 | 3.8 | | 7 | 46 | 3 | 4.1 | | 4 | 79 | 3 | 1.8 | | 8 | 48 | 4 | 2.4 | | 10 | 70 | 6 | 2.6 |
| | Fever, Typho-malarial | 9 | 51 | 5 | 3.9 | | 3 | 56 | 2 | 3.8 | | 4 | 52 | 2 | 2.6 | | 6 | 48 | 3 | 3.7 | | 4 | 43 | 2 | 3.3 | | 5 | 30 | 1 | 4.5 |
| | Influenza | 72 | 77 | 56 | 1.9 | | 74 | 78 | 58 | 1.9 | | 78 | 72 | 57 | 2.0 | | 66 | 72 | 48 | 2.1 | | 58 | 69 | 40 | 2.0 | | 34 | 61 | 21 | 2.5 |
| | Kidney, Inflammation of | 82 | 61 | 19 | 3.5 | | 32 | 57 | 18 | 3.5 | | 37 | 53 | 20 | 3.7 | | 34 | 62 | 22 | 4.2 | | 39 | 52 | 21 | 3.6 | | 32 | 61 | 19 | 2.7 |
| | Measles | 18 | 51 | 10 | 3.3 | | 23 | 56 | 12 | 2.4 | | 21 | 50 | 10 | 2.4 | | 20 | 58 | 11 | 2.4 | | 33 | 51 | 17 | 2.6 | | 21 | 63 | 13 | 2.2 |
| | Neuralgia | 75 | 75 | 57 | 2.5 | | 79 | 79 | 62 | 2.4 | | 88 | 74 | 65 | 2.4 | | 82 | 72 | 61 | 2.5 | | 78 | 71 | 56 | 2.3 | | 67 | 75 | 50 | 2.1 |
| | Pleuritis | 33 | 62 | 21 | 3.9 | | 35 | 56 | 20 | 3.4 | | 42 | 50 | 21 | 3.9 | | 30 | 52 | 17 | 4.1 | | 28 | 44 | 18 | 3.4 | | 21 | 51 | 11 | 3.7 |
| | Pneumonia | 57 | 59 | 34 | 3.4 | | 54 | 67 | 36 | 3.2 | | 53 | 63 | 34 | 3.5 | | 48 | 60 | 31 | 3.8 | | 42 | 48 | 20 | 3.6 | | 24 | 52 | 12 | 3.4 |
| | Puerperal Fever | 12 | 40 | 5 | 4.0 | | 9 | 41 | 4 | 3.7 | | 9 | 33 | 3 | 3.8 | | 10 | 51 | 5 | 4.1 | | 10 | 36 | 4 | 2.8 | | 11 | 43 | 5 | 3.2 |
| | Rheumatism | 83 | 78 | 66 | 2.7 | | 82 | 81 | 67 | 2.7 | | 87 | 78 | 68 | 2.5 | | 85 | 84 | 73 | 2.4 | | 85 | 78 | 67 | 2.2 | | 78 | 78 | 61 | 2.1 |
| | Scarlatina | 28 | 56 | 16 | 3.1 | | 20 | 57 | 12 | 3.2 | | 23 | 43 | 10 | 4.0 | | 20 | 55 | 12 | 3.3 | | 25 | 47 | 11 | 3.5 | | 19 | 59 | 11 | 3.6 |
| | Small-pox | 2 | 75 | 1 | 4.0 | | 2 | 75 | 2 | 2.4 | | 1 | 25 | 0.2 | 4.0 | | 1 | 25 | 0.2 | 4.0 | | 0 | 0 | 0 | 0 | | 1 | 25 | 0.2 | 4.0 |
| | Tonsillitis | 85 | 73 | 62 | 2.5 | | 77 | 76 | 59 | 2.6 | | 84 | 74 | 61 | 2.5 | | 75 | 70 | 54 | 2.7 | | 75 | 66 | 49 | 2.6 | | 59 | 63 | 37 | 2.8 |
| | Whooping-cough | 15 | 44 | 7 | 3.1 | | 15 | 60 | 9 | 3.1 | | 11 | 62 | 7 | 2.8 | | 15 | 45 | 7 | 3.0 | | 18 | 56 | 10 | 2.4 | | 19 | 59 | 12 | 2.3 |

| | July.† | | | | August.† | | | | September.† | | | | October.† | | | | November.† | | | | December.† | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Av. for Tab. Dis. Rep. Pres. | 29 | 62 | 18 | 2.8 | 34 | 62 | 21 | 3.1 | 31 | 67 | 21 | 3.2 | 30 | 65 | 20 | 3.0 | 32 | 63 | 20 | 3.1 | 28 | 71 | 20 | 3.4 |
| Brain, Inflammation of | 7 | 34 | 2 | 3.4 | 9 | 26 | 2 | 3.9 | 5 | 48 | 2 | 6.0 | 7 | 53 | 4 | 4.8 | 8 | 23 | 2 | 5.7 | 7 | 34 | 2 | 4.0 |
| Bowels, Inflammation of | 29 | 48 | 13 | 3.0 | 46 | 44 | 20 | 3.7 | 27 | 55 | 16 | 4.7 | 27 | 53 | 14 | 4.2 | 21 | 47 | 10 | 4.6 | 18 | 49 | 9 | 4.8 |
| Bronchitis | 57 | 63 | 35 | 2.7 | 54 | 63 | 84 | 3.1 | 57 | 66 | 89 | 3.2 | 70 | 69 | 48 | 2.7 | 80 | 75 | 61 | 2.4 | 77 | 82 | 62 | 2.6 |
| Cerebro-spinal Meningitis | 4 | 42 | 2 | 4.2 | 3 | 24 | 1 | 6.5 | 6 | 38 | 2 | 5.0 | 3 | 40 | 1 | 3.8 | 4 | 35 | 1 | 5.2 | 4 | 40 | 2 | 5.2 |
| Cholera Infantum | 31 | 55 | 17 | 3.3 | 55 | 64 | 34 | 3.0 | 53 | 62 | 33 | 3.3 | 30 | 49 | 15 | 3.0 | 7 | 86 | 2 | 5.3 | 2 | 33 | 1 | 6.7 |
| Cholera Morbus | 47 | 52 | 24 | 3.1 | 69 | 63 | 43 | 2.8 | 59 | 64 | 38 | 3.1 | 25 | 49 | 13 | 3.7 | 19 | 28 | 5 | 3.9 | 7 | 41 | 3 | 5.8 |
| Consumption, Pulmonary | 48 | 76 | 35 | 3.2 | 48 | 77 | 37 | 3.6 | 43 | 82 | 37 | 3.6 | 41 | 78 | 82 | 3.4 | 47 | 79 | 37 | 3.9 | 45 | 82 | 38 | 4.3 |
| Croup, Membranous | 1 | 75 | 1 | 6.0 | 4 | 85 | 1 | 3.8 | 1 | 50 | .02 | 2.0 | 2 | 50 | 1 | 3.8 | 9 | 32 | 3 | 5.4 | 4 | 50 | 2 | 4.6 |
| Diphtheria | 13 | 52 | 7 | 2.9 | 16 | 49 | 8 | 3.4 | 11 | 55 | 6 | 3.5 | 9 | 62 | 6 | 3.5 | 13 | 58 | 8 | 3.7 | 11 | 54 | 6 | 3.8 |
| Diarrhea | 78 | 69 | 54 | 2.0 | 90 | 82 | 74 | 1.7 | 86 | 85 | 75 | 1.8 | 79 | 70 | 55 | 2.4 | 54 | 52 | 29 | 3.1 | 39 | 61 | 24 | 3.9 |
| Dysentery | 24 | 58 | 13 | 3.6 | 57 | 59 | 34 | 3.2 | 59 | 69 | 41 | 3.3 | 48 | 52 | 25 | 3.3 | 23 | 39 | 9 | 4.0 | 7 | 34 | 2 | 5.3 |
| Erysipelas | 29 | 52 | 15 | 3.7 | 20 | 39 | 8 | 4.5 | 19 | 48 | 9 | 3.5 | 23 | 48 | 11 | 3.8 | 25 | 48 | 12 | 3.8 | 30 | 53 | 15 | 4.4 |
| Fever, Intermittent | 45 | 60 | 27 | 2.4 | 49 | 67 | 32 | 2.8 | 40 | 68 | 29 | 3.1 | 43 | 66 | 28 | 2.5 | 36 | 70 | 26 | 3.0 | 23 | 71 | 17 | 4.0 |
| Fever, Remittent | 80 | 65 | 20 | 2.6 | 33 | 59 | 22 | 3.0 | 34 | 69 | 25 | 3.0 | 31 | 78 | 24 | 2.7 | 39 | 54 | 21 | 2.9 | 20 | 60 | 12 | 3.8 |
| Fever, Typhoid (enteric) | 12 | 62 | 7 | 3.6 | 21 | 54 | 12 | 3.4 | 28 | 57 | 16 | 3.5 | 32 | 73 | 23 | 2.6 | 29 | 68 | 20 | 2.7 | 13 | 63 | 8 | 4.5 |
| Fever, Typho-malarial | 6 | 87 | 2 | 2.9 | 19 | 34 | 7 | 3.4 | 17 | 53 | 9 | 3.3 | 16 | 49 | 8 | 3.1 | 13 | 59 | 8 | 4.0 | 8 | 50 | 4 | 5.2 |
| Influenza | 23 | 61 | 14 | 2.8 | 28 | 59 | 16 | 3.1 | 34 | 70 | 25 | 2.7 | 42 | 67 | 29 | 2.8 | 86 | 72 | 62 | 1.7 | 98 | 95 | 93 | 1.1 |
| Kidney, Inflammation of | 30 | 57 | 17 | 3.5 | 22 | 57 | 13 | 3.6 | 22 | 64 | 14 | 3.6 | 20 | 68 | 14 | 4.1 | 27 | 55 | 15 | 4.1 | 21 | 57 | 12 | 4.2 |
| Measles | 17 | 48 | 8 | 2.9 | 6 | 59 | 3 | 5.6 | 2 | 64 | 2 | 3.3 | 2 | 33 | 1 | 4.0 | 3 | 53 | 2 | 3.5 | 3 | 50 | 2 | 5.3 |
| Neuralgia | 73 | 70 | 51 | 2.2 | 73 | 73 | 53 | 2.8 | 66 | 79 | 54 | 2.7 | 78 | 75 | 55 | 2.3 | 78 | 76 | 60 | 2.7 | 78 | 74 | 57 | 3.1 |
| Pleuritis | 21 | 49 | 11 | 3.4 | 15 | 44 | 7 | 4.3 | 18 | 50 | 9 | 4.1 | 20 | 45 | 10 | 3.4 | 27 | 44 | 12 | 3.8 | 35 | 62 | 22 | 4.2 |
| Pneumonia | 17 | 50 | 8 | 3.2 | 15 | 49 | 7 | 3.7 | 19 | 47 | 9 | 4.5 | 22 | 52 | 12 | 3.6 | 52 | 45 | 24 | 3.9 | 50 | 67 | 34 | 3.9 |
| Puerperal Fever | 9 | 49 | 4 | 3.3 | 7 | 42 | 3 | 3.3 | 9 | 82 | 3 | 4.3 | 7 | 37 | 2 | 3.3 | 10 | 27 | 3 | 5.7 | 5 | 26 | 1 | 4.5 |
| Rheumatism | 76 | 79 | 60 | 2.1 | 79 | 75 | 58 | 2.9 | 74 | 76 | 57 | 3.0 | 79 | 80 | 64 | 2.4 | 78 | 82 | 64 | 2.7 | 78 | 83 | 65 | 3.2 |
| Scarlatina | 13 | 56 | 7 | 3.8 | 16 | 45 | 7 | 4.1 | 13 | 53 | 7 | 4.2 | 17 | 62 | 10 | 3.8 | 18 | 58 | 11 | 3.3 | 21 | 58 | 12 | 3.6 |
| Small-pox | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tonsillitis | 63 | 60 | 37 | 2.5 | 66 | 52 | 34 | 3.3 | 55 | 62 | 35 | 3.3 | 67 | 65 | 44 | 3.0 | 77 | 68 | 53 | 2.9 | 74 | 75 | 55 | 3.4 |
| Whooping-cough | 20 | 58 | 11 | 2.0 | 20 | 65 | 13 | 3.1 | 14 | 62 | 9 | 4.3 | 9 | 73 | 7 | 3.6 | 14 | 55 | 7 | 3.9 | 16 | 51 | 8 | 3.6 |

[Foot-notes from page 97.]

† The numbers opposite the names of the diseases do not state what per cent of the whole number of observers for the year reported the disease present at some time during the year, but state (on an average for the 12 months of the year) by what per cent of the observers making reports for the several months, the disease was reported present in those months. The column for each year is thus a statement for an average month of that year. On the two following pages of this table, however, the columns for each month state what per cent of the observers for that month (the number of whom is stated at the foot of the column) reported the given disease in that month.

[Foot-note from pages 91, 92 and 93.]

‡ Consumption, remittent fever and typho-malarial fever were not printed on the first blanks used in making weekly reports (beginning with the month of September, 1878); neuralgia and tonsillitis were not printed on any blanks used prior to October, 1878, and not on all used for several months after that date; inflammation of brain and inflammation of bowels were not printed on any blanks used prior to July, 1879, and not on all used for several months after that date; inflammation of kidney was not printed on any of the cards used prior to October, 1883, and not on all used for several months after that date; pleuritis was not printed on any cards used prior to 1883; hence it is probable that the diseseases were not so fully reported at first as were the other diseases.

TABLE 2.—CONTINUED.—*Diseases in the Upper Peninsula, the Northwestern, the Northern, and the Northeastern Divisions of the State for the years 1877–1892, also for the years 1886–1892, for the year and by months in 1893.—Indicating what Per Cent of the Weekly Reports Received stated the Presence of the Diseases named.*[d]

| Division.* | Diseases. | 1877-92.‡ | 1886-92. | 1893.† | January. | February. | March. | April. | May. | June. | July. | August.‡ | September. | October. | November. | December. | Division.* | 1877-92.‡ | 1886-92. | 1893.† | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Av. for Tab. Dis. Rep. Pr. | 28 | 25 | 21 | 19 | 23 | 22 | 27 | 24 | 18 | 20 | 20 | 21 | 18 | 21 | 19 |  | 30 | 27 | 19 | 26 | 21 | 21 | 18 | 19 | 18 | 17 | 15 | 23 | 16 | 17 | 19 |
| Upper Peninsular Division.* | Brain, Inflammation of | 7 | 8 | 6 | 0 | 11 | 3 | 9 | 6 | 10 | 3 | 5 | 0 | 12 | 6 | 7 | Northwestern Division.* | 6 | 8 | 2 | 9 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Bowels, inflammation of | 17 | 13 | 13 | 7 | 8 | 5 | 17 | 6 | 24 | 17 | 24 | 25 | 9 | 11 | 7 |  | 12 | 15 | 17 | 38 | 9 | 20 | 0 | 17 | 35 | 15 | 0 | 0 | 88 | 0 | 0 |
|  | Bronchitis | 72 | 72 | 56 | 71 | 71 | 59 | 74 | 81 | 41 | 40 | 37 | 41 | 42 | 62 | 56 |  | 61 | 62 | 64 | 90 | 82 | 67 | 79 | 67 | 65 | 46 | 0 | 100 | 88 | 80 | 100 |
|  | Cerebro-spi. Meningitis | 3 | 3 | 3 | 5 | 3 | 0 | 0 | 9 | 10 | 3 | 0 | 0 | 0 | 2 | 0 |  | 2 | 2 | 3 | 27 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Cholera Infantum | 14 | 14 | 20 | 7 | 3 | 0 | 4 | 0 | 34 | 34 | 78 | 63 | 18 | 0 | 2 |  | 21 | 19 | 8 | 0 | 0 | 0 | 0 | 6 | 6 | 15 | 36 | 50 | 0 | 0 | 0 |
|  | Cholera Morbus | 20 | 24 | 14 | 5 | 13 | 3 | 13 | 3 | 14 | 23 | 49 | 38 | 3 | 4 | 7 |  | 20 | 17 | 17 | 18 | 18 | 20 | 7 | 6 | 6 | 23 | 45 | 50 | 0 | 40 | 0 |
|  | Consumption, Pulmonary | 62 | 44 | 43 | 32 | 47 | 41 | 65 | 53 | 28 | 43 | 41 | 38 | 48 | 49 | 41 |  | 46 | 55 | 21 | 0 | 18 | 67 | 29 | 39 | 12 | 8 | 9 | 0 | 0 | 0 | 0 |
|  | Croup, Membranous | 6 | 6 | 3 | 0 | 5 | 0 | 0 | 3 | 0 | 0 | 5 | 3 | 6 | 9 | 0 |  | 6 | 3 | 1 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Diphtheria | 10 | 12 | 14 | 17 | 26 | 22 | 17 | 16 | 17 | 17 | 5 | 9 | 12 | 11 | 5 |  | 12 | 5 | 13 | 9 | 0 | 0 | 0 | 17 | 12 | 15 | 36 | 0 | 0 | 60 | 67 |
|  | Diarrhea | 62 | 64 | 46 | 29 | 42 | 35 | 61 | 53 | 28 | 83 | 78 | 69 | 36 | 38 | 15 |  | 52 | 44 | 36 | 36 | 27 | 7 | 50 | 28 | 18 | 54 | 64 | 100 | 50 | 40 | 0 |
|  | Dysentery | 24 | 20 | 15 | 20 | 16 | 30 | 22 | 13 | 7 | 11 | 27 | 25 | 9 | 6 | 2 |  | 28 | 25 | 9 | 27 | 0 | 7 | 7 | 6 | 12 | 8 | 0 | 75 | 0 | 0 | 0 |
|  | Erysipelas | 22 | 17 | 14 | 17 | 13 | 8 | 17 | 38 | 21 | 20 | 5 | 13 | 3 | 9 | 10 |  | 29 | 21 | 22 | 18 | 9 | 40 | 36 | 44 | 29 | 8 | 0 | 0 | 0 | 0 | 33 |
|  | Fever, Intermittent | 8 | 6 | 0.5 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |  | 59 | 37 | 12 | 9 | 0 | 7 | 36 | 22 | 6 | 15 | 0 | 0 | 12 | 0 | 0 |
|  | Fever, Remittent | 11 | 5 | 0.7 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |  | 36 | 34 | 24 | 18 | 18 | 13 | 7 | 33 | 18 | 23 | 36 | 100 | 50 | 0 | 0 |
|  | Fever, Typhoid (enteric) | 29 | 28 | 31 | 20 | 13 | 14 | 0 | 22 | 31 | 40 | 29 | 38 | 67 | 60 | 29 |  | 11 | 12 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 75 | 100 | 67 |
|  | Fever, Typho-malarial | 4 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 9 | 0 | 0 | 0 |  | 21 | 11 | 6 | 0 | 0 | 20 | 7 | 0 | 0 | 0 | 9 | 25 | 25 | 0 | 0 |
|  | Influenza | 41 | 29 | 41 | 39 | 50 | 51 | 74 | 63 | 14 | 11 | 0 | 9 | 27 | 64 | 88 |  | 44 | 40 | 22 | 73 | 82 | 27 | 7 | 11 | 0 | 0 | 0 | 0 | 12 | 0 | 100 |
|  | Kidney, Inflammation of | 36 | 25 | 15 | 5 | 11 | 19 | 13 | 13 | 17 | 20 | 15 | 22 | 18 | 19 | 15 |  | 26 | 20 | 15 | 36 | 27 | 13 | 7 | 11 | 24 | 81 | 0 | 0 | 0 | 0 | 0 |
|  | Measles | 16 | 14 | 7 | 0 | 8 | 11 | 0 | 28 | 17 | 11 | 7 | 6 | 0 | 2 | 0 |  | 12 | 8 | 21 | 9 | 45 | 33 | 14 | 39 | 35 | 8 | 0 | 0 | 0 | 0 | 0 |
|  | Neuralgia | 57 | 58 | 49 | 51 | 55 | 62 | 65 | 47 | 34 | 34 | 44 | 53 | 55 | 49 | 46 |  | 67 | 59 | 62 | 100 | 91 | 93 | 79 | 33 | 35 | 38 | 27 | 100 | 50 | 80 | 67 |
|  | Pleuritis | 21 | 21 | 17 | 20 | 32 | 30 | 17 | 16 | 28 | 11 | 0 | 9 | 0 | 13 | 24 |  | 27 | 27 | 10 | 27 | 9 | 7 | 7 | 17 | 12 | 0 | 0 | 0 | 12 | 0 | 33 |
|  | Pneumonia | 36 | 29 | 28 | 29 | 45 | 38 | 52 | 19 | 7 | 17 | 7 | 9 | 18 | 51 | 39 |  | 41 | 44 | 32 | 55 | 64 | 40 | 36 | 28 | 35 | 15 | 9 | 0 | 12 | 60 | 0 |
|  | Puerperal Fever | 6 | 6 | 10 | 17 | 5 | 5 | 13 | 9 | 17 | 14 | 10 | 9 | 3 | 11 | 2 |  | 5 | 5 | 5 | 0 | 0 | 13 | 0 | 0 | 24 | 8 | 0 | 0 | 0 | 0 | 0 |
|  | Rheumatism | 62 | 57 | 51 | 51 | 68 | 73 | 74 | 72 | 41 | 49 | 39 | 38 | 36 | 30 | 49 |  | 68 | 63 | 52 | 73 | 55 | 67 | 79 | 50 | 29 | 81 | 64 | 50 | 50 | 0 | 33 |
|  | Scarlatina | 22 | 13 | 23 | 24 | 21 | 22 | 48 | 31 | 31 | 14 | 12 | 18 | 24 | 23 | 20 |  | 17 | 9 | 9 | 0 | 0 | 0 | 0 | 11 | 18 | 23 | 36 | 0 | 0 | 0 | 0 |
|  | Small-pox | 0.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  | 0.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Tonsillitis | 51 | 57 | 52 | 63 | 63 | 76 | 65 | 66 | 31 | 34 | 37 | 38 | 48 | 51 | 49 |  | 57 | 55 | 39 | 55 | 45 | 40 | 7 | 39 | 53 | 77 | 27 | 0 | 25 | 20 | 0 |
|  | Whooping-cough | 21 | 16 | 11 | 10 | 5 | 16 | 13 | 16 | 10 | 9 | 12 | 0 | 9 | 17 | 17 |  | 15 | 7 | 7 | 9 | 0 | 0 | 7 | 0 | 12 | 15 | 18 | 0 | 0 | 0 | 88 |

| | Av. for Tab. Dis. Rep. Pr | 20 | 19 | 22 | 18 | 20 | 24 | 23 | 17 | 18 | 23 | 28 | 27 | 19 | 26 | 25 | | 27 | 24 | 19 | 21 | 21 | 18 | 18 | 18 | 19 | 21 | 24 | 19 | 15 | 17 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Northern Division.* | Brain, Inflammation of | 11 | 16 | 6 | 0 | 8 | 0 | 0 | 8 | 7 | 11 | 5 | 0 | 0 | 10 | 12 | Northeastern Division.* | 4 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 7 | 0 | 0 | 0 | 0 |
| | Bowels, Inflammation of | 8 | 11 | 18 | 5 | 0 | 0 | 0 | 8 | 13 | 33 | 25 | 38 | 7 | 40 | 35 | | 18 | 16 | 18 | 8 | 8 | 7 | 13 | 10 | 10 | 25 | 60 | 25 | 0 | 30 | 0 |
| | Bronchitis | 47 | 45 | 67 | 64 | 58 | 91 | 57 | 58 | 40 | 44 | 60 | 81 | 80 | 85 | 88 | | 72 | 67 | 52 | 75 | 67 | 67 | 50 | 50 | 40 | 42 | 33 | 50 | 50 | 50 | 50 |
| | Cerebro-spinal Mengitis | 5 | 6 | 3 | 0 | 8 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 10 | 6 | | 2 | 1.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cholera infantum | 7 | 8 | 10 | 0 | 4 | 9 | 0 | 0 | 0 | 22 | 40 | 25 | 7 | 0 | 0 | | 9 | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 83 | 33 | 0 | 0 | 0 | 0 |
| | Cholera Morbus | 6 | 7 | 18 | 0 | 8 | 9 | 43 | 0 | 33 | 33 | 55 | 25 | 0 | 15 | 0 | | 10 | 8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 27 | 0 | 0 | 0 | 0 |
| | Consumption, Pulmonary | 36 | 48 | 40 | 45 | 67 | 73 | 57 | 58 | 47 | 33 | 45 | 19 | 0 | 20 | 24 | | 47 | 37 | 16 | 33 | 33 | 33 | 25 | 0 | 0 | 17 | 27 | 0 | 0 | 0 | 0 |
| | Croup, Membranous | 2 | 3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 13 | 10 | 18 | | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Diphtheria | 5 | 2 | 8 | 0 | 0 | 0 | 0 | 17 | 13 | 11 | 5 | 13 | 7 | 10 | 18 | | 8 | 8 | 22 | 83 | 8 | 20 | 13 | 30 | 40 | 83 | 27 | 13 | 38 | 0 | 0 |
| | Diarrhea | 24 | 14 | 35 | 0 | 13 | 18 | 29 | 0 | 33 | 61 | 100 | 69 | 20 | 35 | 29 | | 52 | 44 | 45 | 25 | 25 | 33 | 50 | 50 | 40 | 58 | 67 | 50 | 50 | 50 | 50 |
| | Dysentery | 16 | 11 | 17 | 0 | 13 | 9 | 0 | 0 | 20 | 33 | 60 | 25 | 13 | 5 | 12 | | 18 | 14 | 5 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 33 | 13 | 0 | 0 | 0 |
| | Erysipelas | 25 | 34 | 17 | 23 | 13 | 18 | 0 | 8 | 13 | 17 | 15 | 13 | 33 | 15 | 24 | | 25 | 25 | 17 | 17 | 25 | 27 | 26 | 10 | 50 | 8 | 0 | 38 | 0 | 0 | 13 |
| | Fever, Intermittent | 28 | 28 | 16 | 14 | 4 | 0 | 0 | 8 | 7 | 6 | 25 | 31 | 33 | 25 | 24 | | 37 | 46 | 82 | 33 | 33 | 33 | 38 | 30 | 40 | 58 | 67 | 25 | 0 | 0 | 0 |
| | Fever, Remittent | 11 | 14 | 5 | 9 | 8 | 9 | 0 | 0 | 0 | 0 | 15 | 6 | 0 | 0 | 6 | | 12 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 10 | 8 | 0 | 0 | 0 | 0 | 0 |
| | Fever, Typhoid (enteric) | 9 | 8 | 9 | 18 | 13 | 18 | 14 | 0 | 0 | 6 | 5 | 25 | 7 | 0 | 0 | | 2 | 1.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Fever, Typho-malarial | 7 | 5 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 10 | 19 | 20 | 15 | 0 | | 6 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| | Influenza | 31 | 28 | 51 | 55 | 71 | 100 | 57 | 42 | 13 | 11 | 35 | 44 | 33 | 65 | 88 | | 47 | 55 | 63 | 58 | 67 | 47 | 50 | 50 | 50 | 67 | 67 | 88 | 50 | 80 | 100 |
| | Kidney, Inflammation of | 17 | 18 | 26 | 32 | 17 | 18 | 43 | 33 | 33 | 22 | 25 | 19 | 20 | 30 | 35 | | 30 | 29 | 47 | 58 | 67 | 33 | 38 | 50 | 40 | 42 | 47 | 50 | 50 | 50 | 50 |
| | Measles | 7 | 3 | 18 | 27 | 4 | 36 | 29 | 75 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | | 9 | 8 | 3 | 0 | 0 | 0 | 0 | 0 | 80 | 8 | 0 | 0 | 0 | 0 | 0 |
| | Neuralgia | 49 | 42 | 55 | 41 | 42 | 73 | 43 | 17 | 33 | 50 | 70 | 81 | 53 | 90 | 59 | | 72 | 65 | 55 | 58 | 58 | 53 | 50 | 60 | 50 | 50 | 60 | 50 | 63 | 50 | 50 |
| | Pleuritis | 24 | 24 | 25 | 18 | 25 | 36 | 14 | 0 | 0 | 33 | 0 | 44 | 53 | 35 | 35 | | 29 | 11 | 16 | 33 | 25 | 27 | 18 | 0 | 0 | 33 | 13 | 0 | 0 | 10 | 25 |
| | Pneumonia | 19 | 17 | 20 | 32 | 33 | 27 | 29 | 8 | 33 | 44 | 20 | 13 | 33 | 30 | 41 | | 3 | 25 | 9 | 0 | 17 | 13 | 25 | 50 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Puerperal Fever | 6 | 4 | 6 | 0 | 4 | 9 | 43 | 0 | 0 | 6 | 15 | 6 | 0 | 0 | 6 | | 69 | 2 | 4 | 17 | 17 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Rheumatism | 57 | 53 | 75 | 59 | 63 | 64 | 100 | 67 | 80 | 78 | 95 | 81 | 53 | 95 | 76 | | 5 | 62 | 56 | 67 | 67 | 67 | 50 | 50 | 50 | 58 | 53 | 50 | 50 | 50 | 50 |
| | Scarlatina | 5 | 5 | 5 | 9 | 8 | 9 | 0 | 0 | 0 | 0 | 10 | 6 | 0 | 0 | 12 | | 0 | 8 | 8 | 0 | 0 | 0 | 13 | 0 | 20 | 0 | 0 | 0 | 25 | 50 | 0 |
| | Small-pox | 1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Tonsillitis | 31 | 32 | 57 | 32 | 67 | 55 | 86 | 25 | 73 | 67 | 55 | 56 | 40 | 75 | 59 | | 7 | 50 | 48 | 42 | 67 | 47 | 50 | 50 | 40 | 33 | 33 | 75 | 50 | 50 | 50 |
| | Whooping-cough | 8 | 6 | 5 | 5 | 4 | 0 | 0 | 25 | 0 | 0 | 0 | 6 | 0 | 10 | 6 | | 11 | 8 | 2 | 8 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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*, †, d See page 101. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 13 years, 1880–92; for neuralgia and tonsillitis, an average for the 14 years, 1879 92; pleuritis was not compiled until 1888; for other diseases and for the average line, an average for the 16 years, 1877–92. For the Northern Division, 1882–92. For the Northeastern Division, 1888–92.

TABLE 2.—CONTINUED.—*Diseases in the Western, Northern Central, Bay and Eastern, and the Central Divisions of the State, for the Years 1877–1892, also for the Years 1886–1892, for the Year and by Months in 1893, indicating what Per Cent of the Weekly Reports Received Stated the Presence of the Diseases Named.*[d]

| Division.* | Diseases. | 1877-92 ‡ | 1886-92. | 1893 † | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Division.* | 1877-92.‡ | 1886-92. | 1893.† | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Av. for Tab. Dis. Rep. Pr. | 30 | 26 | 19 | 19 | 17 | 18 | 20 | 18 | 18 | 18 | 19 | 20 | 20 | 19 | 20 | | 24 | 20 | 21 | 17 | 17 | 19 | 20 | 18 | 17 | 26 | 30 | 29 | 24 | 27 | 27 |
| Western Division.* | Brain, Inflammation of | 4 | 4 | 3 | 5 | 0 | 2 | 3 | 0 | 4 | 9 | 2 | 6 | 9 | 0 | 0 | Northern Central Division.* | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Bowels, Inflammation of | 16 | 16 | 12 | 0 | 7 | 13 | 11 | 3 | 11 | 14 | 23 | 24 | 15 | 7 | 13 | | 4 | 4 | 9 | 0 | 6 | 6 | 7 | 7 | 0 | 14 | 38 | 0 | 38 | 20 | 0 |
| | Bronchitis | 54 | 52 | 40 | 56 | 60 | 53 | 59 | 34 | 29 | 26 | 19 | 24 | 36 | 33 | 40 | | 50 | 46 | 49 | 69 | 63 | 39 | 53 | 14 | 36 | 29 | 25 | 29 | 50 | 90 | 88 |
| | Cerebro-spi. Meningitis | 4 | 3.3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 9 | 0 | 0 | 0 | | 6 | 2 | 2 | 6 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cholera Infantum | 14 | 11 | 8 | 0 | 0 | 0 | 0 | 3 | 4 | 20 | 30 | 27 | 9 | 0 | 0 | | 11 | 11 | 10 | 0 | 0 | 6 | 7 | 7 | 27 | 29 | 38 | 43 | 0 | 0 | 0 |
| | Cholera Morbus | 19 | 16 | 8 | 0 | 2 | 2 | 3 | 0 | 4 | 20 | 26 | 33 | 0 | 5 | 3 | | 14 | 12 | 15 | 6 | 0 | 0 | 7 | 0 | 27 | 57 | 50 | 86 | 13 | 0 | 0 |
| | Consumption, Pulmonary | 47 | 43 | 29 | 21 | 23 | 30 | 35 | 34 | 25 | 34 | 35 | 24 | 21 | 21 | 40 | | 34 | 32 | 26 | 6 | 19 | 39 | 33 | 36 | 36 | 43 | 63 | 0 | 0 | 0 | 38 |
| | Croup, Membranous | 6 | 6 | 1 | 0 | 5 | 6 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 6 | 2 | 1 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Diphtheria | 21 | 10 | 8 | 15 | 14 | 4 | 0 | 8 | 14 | 3 | 9 | 9 | 9 | 7 | 0 | | 19 | 5 | 3 | 0 | 0 | 0 | 13 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Diarrhea | 47 | 46 | 36 | 13 | 19 | 13 | 32 | 21 | 50 | 51 | 58 | 73 | 64 | 26 | 27 | | 40 | 34 | 47 | 50 | 38 | 39 | 27 | 14 | 9 | 71 | 75 | 86 | 75 | 70 | 88 |
| | Dysentery | 22 | 16 | 14 | 8 | 2 | 2 | 0 | 3 | 4 | 11 | 47 | 55 | 33 | 7 | 0 | | 15 | 13 | 7 | 0 | 0 | 11 | 0 | 7 | 9 | 14 | 25 | 29 | 13 | 0 | 0 |
| | Erysipelas | 27 | 22 | 9 | 10 | 5 | 0 | 16 | 21 | 11 | 3 | 9 | 0 | 3 | 19 | 17 | | 25 | 20 | 22 | 19 | 31 | 17 | 7 | 14 | 9 | 43 | 25 | 29 | 38 | 30 | 25 |
| | Fever, Intermittent | 67 | 55 | 24 | 28 | 9 | 13 | 27 | 16 | 39 | 31 | 33 | 18 | 33 | 24 | 27 | | 57 | 46 | 59 | 44 | 44 | 56 | 80 | 79 | 55 | 71 | 100 | 57 | 50 | 70 | 13 |
| | Fever, Remittent | 55 | 40 | 33 | 28 | 30 | 26 | 22 | 34 | 32 | 51 | 49 | 36 | 36 | 31 | 17 | | 46 | 35 | 35 | 38 | 25 | 33 | 60 | 43 | 27 | 29 | 25 | 57 | 25 | 10 | 38 |
| | Fever, Typhoid (enteric) | 9 | 7 | 8 | 8 | 9 | 11 | 11 | 8 | 0 | 3 | 9 | 3 | 0 | 10 | 17 | | 8 | 5 | 2 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Fever, Typho-malarial | 21 | 14 | 6 | 0 | 0 | 0 | 14 | 8 | 4 | 6 | 7 | 15 | 9 | 14 | 3 | | 21 | 11 | 1 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Influenza | 46 | 45 | 46 | 54 | 51 | 55 | 65 | 55 | 21 | 9 | 19 | 27 | 24 | 74 | 97 | | 14 | 17 | 41 | 44 | 56 | 61 | 47 | 36 | 0 | 0 | 0 | 43 | 13 | 60 | 88 |
| | Kidney, Inflammation of | 17 | 16 | 19 | 36 | 21 | 21 | 22 | 24 | 18 | 11 | 12 | 18 | 18 | 10 | 10 | | 8 | 9 | 7 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 38 | 0 | 38 | 20 | 13 |
| | Measles | 6 | 10 | 7 | 5 | 9 | 2 | 0 | 5 | 21 | 23 | 7 | 0 | 3 | 5 | 3 | | 14 | 10 | 6 | 6 | 19 | 17 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Neuralgia | 72 | 72 | 50 | 56 | 47 | 62 | 57 | 50 | 43 | 43 | 42 | 33 | 48 | 57 | 57 | | 53 | 50 | 62 | 38 | 56 | 44 | 40 | 29 | 55 | 100 | 75 | 100 | 100 | 100 | 100 |
| | Pleuritis | 20 | 20 | 22 | 23 | 21 | 30 | 27 | 29 | 18 | 11 | 7 | 6 | 24 | 24 | 40 | | 3 | 3 | 12 | 19 | 13 | 17 | 0 | 7 | 9 | 14 | 38 | 0 | 13 | 10 | 13 |
| | Pneumonia | 36 | 30 | 22 | 38 | 35 | 36 | 35 | 24 | 14 | 8 | 5 | 12 | 18 | 24 | 13 | | 29 | 26 | 28 | 19 | 25 | 28 | 33 | 29 | 18 | 14 | 0 | 43 | 25 | 50 | 50 |
| | Puerperal Fever | 6 | 6 | 2 | 5 | 0 | 0 | 0 | 3 | 4 | 9 | 0 | 0 | 0 | 2 | 0 | | 5 | 5 | 18 | 0 | 19 | 17 | 0 | 14 | 27 | 14 | 25 | 14 | 0 | 20 | 13 |
| | Rheumatism | 63 | 66 | 55 | 54 | 56 | 57 | 73 | 58 | 54 | 49 | 44 | 55 | 58 | 55 | 43 | | 58 | 57 | 63 | 31 | 25 | 28 | 47 | 71 | 73 | 100 | 100 | 100 | 100 | 100 | 100 |
| | Scarlatina | 19 | 10 | 11 | 10 | 2 | 2 | 0 | 5 | 21 | 14 | 7 | 12 | 21 | 24 | 17 | | 9 | 10 | 9 | 31 | 6 | 17 | 7 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Small-pox | 0.6 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Tonsilitis | 53 | 51 | 46 | 49 | 37 | 45 | 54 | 47 | 50 | 43 | 30 | 36 | 55 | 57 | 60 | | 51 | 48 | 59 | 31 | 25 | 39 | 53 | 71 | 27 | 86 | 100 | 86 | 88 | 100 | 100 |
| | Whooping-cough | 14 | 11 | 5 | 3 | 9 | 6 | 0 | 3 | 4 | 3 | 5 | 6 | 12 | 5 | 6 | | 12 | 9 | 8 | 6 | 19 | 22 | 13 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 |

| | Av. for Tab. Dis. Rep. Pr. | 31 | 26 | 19 | 19 | 21 | 19 | 18 | 18 | 18 | 16 | 19 | 21 | 21 | 19 | 21 | | 25 | 23 | 20 | 21 | 19 | 20 | 20 | 19 | 19 | 17 | 21 | 21 | 21 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bay and Eastern Division.* | Brain, Inflammation of | 6 | 5 | 1 | 2 | 2 | 0 | 2 | 1 | 3 | 0 | 1 | 0 | 1 | 1 | 0 | Central Division.* | 5 | 4 | 8 | 4 | 2 | 2 | 8 | 1 | 1 | 3 | 4 | 8 | 7 | 3 | 2 |
| | Bowels, Inflammation of | 21 | 20 | 14 | 12 | 15 | 18 | 16 | 10 | 18 | 7 | 18 | 19 | 12 | 8 | 14 | | 13 | 15 | 15 | 11 | 6 | 14 | 15 | 8 | 18 | 13 | 32 | 17 | 25 | 9 | 10 |
| | Bronchitis | 68 | 61 | 52 | 57 | 58 | 57 | 66 | 53 | 50 | 38 | 39 | 39 | 54 | 57 | 58 | | 54 | 54 | 57 | 67 | 69 | 62 | 65 | 60 | 49 | 38 | 39 | 40 | 53 | 70 | 68 |
| | Cerebro-spi. Meningitis | 5 | 4 | 2 | 0 | 0 | 4 | 4 | 3 | 0 | 0 | 0 | 1 | 3 | 0 | 3 | | 4 | 3 | 3 | 9 | 3 | 0 | 2 | 0 | 4 | 3 | 1 | 6 | 4 | 1 | 0 |
| | Cholera Infantum | 17 | 15 | 13 | 0 | 0 | 0 | 0 | 1 | 7 | 15 | 45 | 42 | 25 | 7 | 0 | | 10 | 9 | 6 | 2 | 1 | 1 | 2 | 1 | 1 | 7 | 17 | 22 | 13 | 3 | 0 |
| | Cholera Morbus | 20 | 18 | 13 | 0 | 2 | 3 | 0 | 3 | 7 | 20 | 51 | 38 | 15 | 2 | 2 | | 15 | 15 | 12 | 4 | 6 | 7 | 0 | 3 | 16 | 20 | 30 | 32 | 18 | 9 | 2 |
| | Consumption, Pulmonary | 64 | 55 | 46 | 45 | 54 | 37 | 46 | 53 | 57 | 40 | 39 | 42 | 48 | 49 | 51 | | 54 | 45 | 38 | 42 | 29 | 36 | 48 | 41 | 40 | 36 | 33 | 30 | 35 | 44 | 45 |
| | Croup, Membranous | 8 | 5 | 2 | 2 | 13 | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | | 3 | 4 | 2 | 3 | 5 | 1 | 3 | 3 | 0 | 0 | 1 | 0 | 0 | 3 | 2 |
| | Diphtheria | 22 | 11 | 16 | 20 | 22 | 13 | 7 | 10 | 15 | 18 | 16 | 14 | 13 | 26 | 17 | | 16 | 6 | 4 | 9 | 7 | 3 | 5 | 4 | 5 | 1 | 2 | 4 | 2 | 2 | 4 |
| | Diarrhea | 48 | 43 | 39 | 31 | 26 | 13 | 30 | 32 | 42 | 48 | 71 | 75 | 48 | 20 | 18 | | 43 | 44 | 41 | 29 | 19 | 19 | 26 | 29 | 41 | 45 | 67 | 74 | 67 | 40 | 30 |
| | Dysentery | 18 | 15 | 14 | 2 | 0 | 1 | 0 | 1 | 3 | 15 | 32 | 42 | 87 | 13 | 8 | | 14 | 14 | 13 | 1 | 2 | 3 | 0 | 1 | 5 | 10 | 38 | 47 | 33 | 10 | 1 |
| | Erysipelas | 23 | 20 | 11 | 10 | 20 | 10 | 4 | 18 | 18 | 8 | 3 | 1 | 7 | 11 | 23 | | 19 | 21 | 13 | 10 | 17 | 18 | 29 | 12 | 11 | 16 | 7 | 7 | 9 | 12 | 14 |
| | Fever, Intermittent | 63 | 39 | 11 | 2 | 4 | 6 | 4 | 14 | 13 | 12 | 18 | 10 | 22 | 15 | 3 | | 62 | 47 | 28 | 21 | 16 | 21 | 23 | 28 | 30 | 31 | 34 | 37 | 37 | 29 | 26 |
| | Fever, Remittent | 38 | 24 | 11 | 8 | 13 | 15 | 9 | 7 | 8 | 3 | 10 | 16 | 21 | 16 | 8 | | 42 | 35 | 21 | 13 | 13 | 15 | 15 | 25 | 26 | 28 | 27 | 27 | 24 | 23 | 14 |
| | Fever, Typhoid (enteric) | 10 | 11 | 15 | 12 | 7 | 1 | 5 | 11 | 18 | 13 | 21 | 22 | 31 | 22 | 11 | | 10 | 7 | 6 | 0 | 0 | 1 | 0 | 0 | 3 | 2 | 8 | 19 | 16 | 15 | 1 |
| | Fever, Typho-malarial | 25 | 18 | 8 | 12 | 7 | 7 | 7 | 0 | 0 | 2 | 11 | 19 | 10 | 12 | 6 | | 15 | 9 | 3 | 1 | 0 | 0 | 0 | 4 | 5 | 0 | 7 | 3 | 2 | 7 | 3 |
| | Influenza | 42 | 89 | 35 | 57 | 56 | 61 | 30 | 24 | 8 | 3 | 6 | 13 | 24 | 45 | 95 | | 88 | 40 | 41 | 48 | 51 | 49 | 35 | 33 | 25 | 17 | 18 | 23 | 25 | 60 | 96 |
| | Kidney, Inflammation of | 20 | 18 | 10 | 2 | 9 | 16 | 27 | 17 | 15 | 10 | 5 | 4 | 6 | 7 | 8 | | 22 | 22 | 19 | 15 | 20 | 24 | 25 | 24 | 21 | 15 | 17 | 21 | 18 | 18 | 13 |
| | Measles | 14 | 11 | 6 | 4 | 4 | 4 | 13 | 17 | 11 | 7 | 2 | 0 | 0 | 6 | 6 | | 10 | 9 | 2 | 2 | 2 | 1 | 2 | 3 | 13 | 3 | 2 | 1 | 0 | 0 | 0 |
| | Neuralgia | 69 | 65 | 57 | 45 | 70 | 64 | 64 | 56 | 47 | 45 | 48 | 51 | 60 | 63 | 66 | | 65 | 70 | 62 | 66 | 67 | 70 | 74 | 70 | 58 | 55 | 61 | 56 | 52 | 60 | 60 |
| | Pleuritis | 25 | 25 | 13 | 10 | 9 | 21 | 16 | 8 | 11 | 15 | 9 | 13 | 7 | 12 | 25 | | 15 | 15 | 16 | 22 | 14 | 30 | 22 | 14 | 15 | 7 | 8 | 9 | 8 | 11 | 29 |
| | Pneumonia | 37 | 29 | 19 | 35 | 37 | 87 | 29 | 18 | 10 | 5 | 1 | 7 | 6 | 18 | 35 | | 30 | 25 | 22 | 40 | 31 | 37 | 25 | 17 | 10 | 8 | 13 | 9 | 15 | 24 | 37 |
| | Puerperal Fever | 5 | 4 | 3 | 2 | 7 | 6 | 7 | 1 | 2 | 2 | 0 | 1 | 1 | 2 | 0 | | 5 | 5 | 2 | 2 | 0 | 0 | 3 | 7 | 3 | 1 | 7 | 4 | 0 | 2 | 0 |
| | Rheumatism | 73 | 68 | 61 | 67 | 70 | 64 | 66 | 61 | 57 | 52 | 46 | 57 | 67 | 63 | 63 | | 62 | 65 | 68 | 67 | 71 | 73 | 80 | 79 | 66 | 62 | 66 | 49 | 66 | 68 | 69 |
| | Scarlatina | 16 | 10 | 13 | 22 | 24 | 13 | 13 | 15 | 18 | 7 | 3 | 10 | 9 | 12 | 15 | | 11 | 8 | 6 | 7 | 5 | 10 | 14 | 7 | 5 | 6 | 2 | 2 | 12 | 4 | 7 |
| | Small-pox | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0.3 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Tonsillitis | 49 | 42 | 44 | 59 | 52 | 51 | 48 | 44 | 38 | 40 | 26 | 86 | 43 | 46 | 57 | | 42 | 43 | 48 | 71 | 63 | 59 | 48 | 54 | 86 | 30 | 33 | 32 | 42 | 49 | 59 |
| | Whooping-cough | 21 | 14 | 10 | 6 | 4 | 0 | 4 | 11 | 17 | 13 | 17 | 17 | 7 | 7 | 6 | | 15 | 11 | 11 | 10 | 12 | 10 | 9 | 9 | 14 | 20 | 10 | 10 | 5 | 13 | 9 |

*, †, d. See page 101. ‡ Inflammation of Kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 13 years, 1880-92; for neuralgia and tonsillitis, an average for the 14 years, 1879-92; pleuritis was not compiled until 1888; for other diseases, and for the average line, an average for the 16 years, 1877-92.

TABLE 2.—CONTINUED.—*Diseases in the Southwestern and Southern Central Divisions of the State, for the years 1877–92; also for the years 1886–92, for the year and by Months in 1893.—Indicating what Per Cent of the Weekly Reports Received stated the Presence of the Disease named.*[d]

| Division.* | Diseases. | 1877-92.‡ | 1886-92. | 1893.† | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. | Division.* | 1877-92.‡ | 1886-92. | 1893.† | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Av. for Tab. Dis. Rep. Pr. | 27 | 25 | 21 | 26 | 27 | 25 | 22 | 20 | 17 | 19 | 22 | 21 | 20 | 20 | 21 | | 28 | 28 | 20 | 21 | 20 | 21 | 20 | 19 | 19 | 18 | 21 | 24 | 21 | 20 | 21 |
| Southwestern Division.* | Brain, Inflammation of | 3 | 3 | 3 | 6 | 7 | 8 | 6 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | Southern Central Division.* | 4 | 4 | 2 | 3 | 3 | 5 | 2 | 1 | 8 | 1 | 2 | 1 | 1 | 2 | 2 |
| | Bowels, Inflammation of | 11 | 13 | 10 | 6 | 22 | 21 | 11 | 8 | 7 | 11 | 19 | 5 | 2 | 4 | 3 | | 14 | 14 | 9 | 4 | 4 | 4 | 9 | 7 | 9 | 12 | 12 | 15 | 12 | 11 | 6 |
| | Bronchitis | 54 | 55 | 53 | 72 | 83 | 79 | 62 | 54 | 44 | 35 | 30 | 29 | 45 | 61 | 59 | | 63 | 60 | 52 | 64 | 66 | 61 | 62 | 55 | 34 | 32 | 32 | 35 | 47 | 59 | 71 |
| | Cerebro-spi. Meningitis | 2 | 1 | 2 | 8 | 7 | 2 | 0 | 2 | 1 | 1 | 1 | 2 | 0 | 0 | 2 | | 3 | 2 | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 2 | 2 | 0 | 0 | 3 | 4 |
| | Cholera Infantum | 18 | 15 | 16 | 2 | 2 | 0 | 0 | 2 | 15 | 28 | 55 | 54 | 21 | 0 | 2 | | 11 | 11 | 8 | 2 | 1 | 2 | 1 | 0 | 7 | 9 | 22 | 30 | 14 | 3 | 2 |
| | Cholera Morbus | 16 | 17 | 18 | 2 | 0 | 3 | 2 | 4 | 15 | 41 | 64 | 56 | 14 | 0 | 0 | | 18 | 16 | 15 | 5 | 4 | 8 | 4 | 5 | 13 | 20 | 43 | 45 | 18 | 6 | 6 |
| | Consumption, Pulmonary | 66 | 56 | 41 | 26 | 33 | 53 | 49 | 45 | 31 | 31 | 40 | 46 | 41 | 50 | 38 | | 57 | 49 | 37 | 39 | 33 | 40 | 36 | 40 | 39 | 40 | 34 | 44 | 34 | 31 | 30 |
| | Croup, Membranous | 4 | 3 | 5 | 6 | 9 | 11 | 5 | 2 | 1 | 4 | 5 | 0 | 2 | 5 | 7 | | 3 | 3 | 1 | 2 | 2 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | Diphtheria | 10 | 4 | 4 | 10 | 7 | 5 | 3 | 4 | 4 | 3 | 6 | 2 | 2 | 0 | 0 | | 12 | 8 | 4 | 0 | 4 | 3 | 4 | 11 | 6 | 2 | 4 | 5 | 3 | 6 | 4 |
| | Diarrhea | 38 | 37 | 39 | 22 | 26 | 21 | 19 | 22 | 40 | 65 | 79 | 76 | 55 | 14 | 17 | | 47 | 48 | 44 | 38 | 27 | 40 | 28 | 27 | 32 | 49 | 78 | 84 | 60 | 29 | 24 |
| | Dysentery | 15 | 17 | 13 | 10 | 7 | 3 | 2 | 3 | 4 | 17 | 35 | 39 | 24 | 8 | 0 | | 18 | 20 | 17 | 11 | 6 | 9 | 10 | 5 | 21 | 9 | 36 | 51 | 25 | 10 | 5 |
| | Erysipelas | 23 | 24 | 19 | 28 | 24 | 23 | 29 | 22 | 12 | 15 | 16 | 14 | 12 | 18 | 22 | | 18 | 17 | 11 | 13 | 17 | 15 | 17 | 7 | 11 | 18 | 5 | 6 | 12 | 7 | 10 |
| | Fever, Intermittent | 67 | 47 | 31 | 28 | 28 | 19 | 32 | 36 | 29 | 41 | 41 | 31 | 34 | 32 | 16 | | 64 | 44 | 30 | 23 | 13 | 25 | 34 | 30 | 29 | 27 | 41 | 41 | 35 | 36 | 24 |
| | Fever, Remittent | 43 | 32 | 21 | 12 | 13 | 18 | 11 | 21 | 32 | 28 | 23 | 24 | 22 | 24 | 16 | | 48 | 38 | 22 | 16 | 13 | 11 | 10 | 19 | 24 | 23 | 29 | 38 | 33 | 29 | 17 |
| | Fever, Typhoid (enteric) | 6 | 5 | 8 | 10 | 0 | 0 | 0 | 0 | 1 | 6 | 11 | 14 | 17 | 23 | 10 | | 8 | 7 | 7 | 3 | 0 | 0 | 3 | 1 | 1 | 2 | 11 | 14 | 22 | 17 | 5 |
| | Fever, Typho-malarial | 19 | 17 | 4 | 2 | 0 | 0 | 5 | 2 | 0 | 0 | 3 | 10 | 17 | 5 | 7 | | 15 | 10 | 4 | 6 | 3 | 0 | 0 | 0 | 1 | 6 | 8 | 8 | 9 | 6 | 7 |
| | Influenza | 44 | 42 | 47 | 66 | 70 | 68 | 52 | 44 | 22 | 17 | 18 | 31 | 40 | 73 | 90 | | 42 | 48 | 48 | 59 | 56 | 56 | 51 | 51 | 30 | 15 | 22 | 25 | 36 | 71 | 93 |
| | Kidney, Inflammation of | 16 | 17 | 20 | 40 | 35 | 42 | 29 | 19 | 19 | 15 | 10 | 10 | 9 | 11 | 7 | | 17 | 17 | 13 | 14 | 11 | 11 | 17 | 19 | 17 | 19 | 9 | 13 | 13 | 9 | 11 |
| | Measles | 10 | 10 | 13 | 40 | 41 | 27 | 35 | 21 | 1 | 1 | 0 | 0 | 2 | 0 | 3 | | 10 | 8 | 7 | 9 | 8 | 10 | 9 | 17 | 13 | 10 | 7 | 4 | 2 | 1 | 0 |
| | Neuralgia | 70 | 65 | 56 | 66 | 78 | 68 | 54 | 56 | 53 | 55 | 53 | 46 | 50 | 53 | 55 | | 71 | 73 | 61 | 60 | 61 | 69 | 56 | 61 | 57 | 57 | 55 | 68 | 65 | 65 | 59 |
| | Pleuritis | 19 | 19 | 14 | 28 | 22 | 21 | 24 | 16 | 4 | 7 | 3 | 0 | 5 | 16 | 26 | | 18 | 18 | 12 | 22 | 21 | 16 | 12 | 11 | 11 | 9 | 9 | 10 | 6 | 5 | 7 |
| | Pneumonia | 31 | 30 | 19 | 36 | 41 | 27 | 32 | 19 | 9 | 4 | 5 | 3 | 3 | 26 | 40 | | 33 | 29 | 24 | 38 | 40 | 36 | 33 | 27 | 16 | 8 | 9 | 13 | 11 | 18 | 33 |
| | Puerperal Fever | 3 | 4 | 4 | 2 | 2 | 5 | 5 | 6 | 3 | 6 | 0 | 2 | 10 | 4 | 5 | | 3 | 2.5 | 1 | 3 | 2 | 0 | 1 | 2 | 3 | 0 | 0 | 1 | 2 | 1 | 0 |
| | Rheumatism | 76 | 77 | 72 | 84 | 80 | 76 | 76 | 71 | 62 | 65 | 59 | 68 | 71 | 81 | 76 | | 73 | 76 | 67 | 68 | 65 | 71 | 70 | 65 | 69 | 66 | 62 | 62 | 68 | 68 | 72 |
| | Scarlatina | 11 | 8 | 8 | 24 | 20 | 0 | 5 | 6 | 9 | 3 | 6 | 10 | 10 | 4 | 12 | | 14 | 11 | 12 | 14 | 13 | 16 | 17 | 19 | 12 | 9 | 10 | 6 | 7 | 8 | 11 |
| | Small-pox | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0.3 | 0 | 1 | 5 | 8 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Tonsillitis | 45 | 46 | 46 | 78 | 72 | 76 | 57 | 47 | 31 | 25 | 29 | 22 | 36 | 54 | 48 | | 51 | 52 | 54 | 71 | 66 | 74 | 60 | 53 | 36 | 39 | 43 | 35 | 45 | 55 | 64 |
| | Whooping-cough | 15 | 14 | 10 | 2 | 20 | 15 | 13 | 15 | 10 | 11 | 14 | 0 | 3 | 5 | 12 | | 16 | 13 | 10 | 6 | 7 | 3 | 3 | 12 | 19 | 12 | 22 | 14 | 11 | 3 | 5 |

*, †, d. See page 101. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 13 years, 1880–92; for neuralgia and tonsillitis, an average for the 14 years, 1879–92; pluritis was not compiled until 1888; for other diseases and for the average line, an average for the 16 years 1877–92.

TABLE 2.—CONCLUDED.—*Diseases in the Southeastern Division of the State, for the Years 1877–92, also for the years 1886–92, for the Year and by Months in 1893.—Indicating what per cent of the Weekly Reports Received stated the Presence of the Diseases named.*[d]

| Division.* | Diseases. | 1877–92.‡ | 1886–92. | 1893.† | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Av. for Tab. Dis. Rep. Pres. | 31 | 25 | 17 | 19 | 22 | 18 | 20 | 15 | 15 | 15 | 16 | 16 | 15 | 15 | 13 |
| Southeastern Division.* | Brain, Inflammation of | 11 | 7 | 2 | 0 | 8 | 0 | 0 | 3 | 0 | 0 | 3 | 3 | 9 | 0 | 0 |
| | Bowels, Inflammation of | 18 | 14 | 7 | 17 | 3 | 7 | 0 | 5 | 3 | 13 | 3 | 6 | 15 | 7 | 3 |
| | Bronchitis | 67 | 64 | 50 | 75 | 69 | 60 | 71 | 46 | 29 | 30 | 34 | 46 | 41 | 51 | 41 |
| | Cerebro-spinal Meningitis | 6 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cholera infantum | 14 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 15 | 7 | 11 | 3 | 6 | 0 | 0 |
| | Cholera Morbus | 21 | 16 | 10 | 3 | 3 | 2 | 4 | 13 | 9 | 17 | 32 | 17 | 12 | 5 | 0 |
| | Consumption, Pulmonary | 72 | 60 | 41 | 47 | 67 | 57 | 71 | 46 | 41 | 33 | 42 | 46 | 6 | 23 | 19 |
| | Croup, Membranous | 10 | 6 | 1 | 3 | 6 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Diphtheria | 24 | 13 | 3 | 17 | 3 | 0 | 14 | 0 | 3 | 0 | 5 | 0 | 0 | 0 | 0 |
| | Diarrhea | 50 | 46 | 31 | 17 | 19 | 19 | 18 | 26 | 29 | 37 | 74 | 54 | 41 | 16 | 19 |
| | Dysentery | 23 | 17 | 7 | 0 | 3 | 7 | 0 | 5 | 3 | 23 | 18 | 14 | 9 | 7 | 0 |
| | Erysipelas | 31 | 27 | 15 | 11 | 25 | 17 | 7 | 13 | 12 | 17 | 11 | 26 | 26 | 9 | 3 |
| | Fever, Intermittent | 58 | 38 | 20 | 11 | 14 | 12 | 11 | 18 | 32 | 33 | 29 | 37 | 12 | 21 | 16 |
| | Fever, Remittent | 87 | 25 | 12 | 0 | 0 | 10 | 18 | 18 | 21 | 10 | 13 | 9 | 29 | 21 | 0 |
| | Fever, Typhoid (enteric) | 21 | 15 | 5 | 0 | 8 | 0 | 0 | 0 | 12 | 0 | 3 | 6 | 24 | 7 | 0 |
| | Fever, Typho-malarial | 20 | 11 | 4 | 17 | 6 | 10 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 14 | 0 |
| | Influenza | 42 | 37 | 42 | 67 | 72 | 57 | 64 | 18 | 29 | 10 | 11 | 31 | 15 | 40 | 91 |
| | Kidney, Inflammation of | 25 | 25 | 22 | 28 | 22 | 24 | 29 | 33 | 24 | 17 | 18 | 11 | 9 | 33 | 13 |
| | Measles | 15 | 10 | 8 | 3 | 25 | 12 | 7 | 21 | 12 | 13 | 0 | 0 | 0 | 0 | 0 |
| | Neuralgia | 56 | 55 | 42 | 36 | 47 | 48 | 64 | 54 | 44 | 43 | 47 | 29 | 32 | 87 | 22 |
| | Pleuritis | 15 | 15 | 9 | 11 | 22 | 2 | 11 | 8 | 6 | 3 | 5 | 6 | 15 | 9 | 6 |
| | Pneumonia | 37 | 26 | 11 | 11 | 28 | 24 | 11 | 5 | 0 | 0 | 8 | 6 | 6 | 7 | 31 |
| | Puerperal Fever | 8 | 6 | 4 | 11 | 8 | 2 | 14 | 0 | 0 | 7 | 5 | 0 | 3 | 0 | 0 |
| | Rheumatism | 72 | 70 | 63 | 72 | 75 | 69 | 79 | 64 | 59 | 67 | 63 | 54 | 59 | 51 | 53 |
| | Scarlatina | 22 | 13 | 8 | 28 | 8 | 2 | 4 | 3 | 0 | 0 | 3 | 0 | 3 | 21 | 22 |
| | Small-pox | 2.7 | 1 | 0.5 | 0 | 0 | 2 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Tonsillitis | 47 | 46 | 39 | 47 | 58 | 52 | 64 | 31 | 29 | 23 | 21 | 31 | 32 | 42 | 28 |
| | Whooping-cough | 23 | 14 | 4 | 11 | 11 | 10 | 7 | 0 | 0 | 7 | 8 | 0 | 0 | 2 | 8 |

*, †, d. See page 101. ‡ Inflammation of kidney was not compiled until 1884. For inflammation of brain and inflammation of bowels, an average for the 13 years, 1880-92; for neuralgia and tonsillitis an average for the 14 years, 1879-92; pleuritis was not compiled until 1888; for other diseases and for average line an average for the 16 years, 1877-92.

TABLE 4.—*A Summary for the Year 1893, relative to Diseases in each of the Eleven Divisions of the State,—indicating the prevalence as regards both Time and Area.*

| Diseases. | Upper Peninsular Division.* | | | | Northwestern Division.* | | | | Northern Division.* | | | | Northeastern Division.* | | | | Western Division.* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Per cent of Observers Reporting presence of, b | Av. per cent of weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Per cent of Observers Reporting Presence of, b | Av. per cent of Weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Per cent of Observers Reporting Presence of, b | Av. per cent of Weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Per cent of Observers Reporting Presence of, b | Av. per cent of Weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Per cent of Observers Reporting Presence of, b | Av. per cent of Weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e |
| Av. for Tab. Dis. Reported Present | 32 | 65 | 21 | 3.1 | 34 | 56 | 19 | 2.2 | 35 | 63 | 22 | 2.4 | 26 | 75 | 19 | 3.3 | 30 | 63 | 19 | 2.9 |
| Brain, inflammation of | 17 | 33 | 6 | 3.4 | 6 | 29 | 2 | 2.5 | 18 | 31 | 6 | 2.8 | 7 | 22 | 2 | 5.0 | 8 | 41 | 3 | 3.6 |
| Bowels, inflammation of | 32 | 40 | 13 | 3.7 | 35 | 48 | 17 | 2.7 | 35 | 51 | 18 | 2.9 | 37 | 49 | 18 | 4.3 | 28 | 49 | 12 | 3.2 |
| Bronchitis | 79 | 69 | 56 | 2.2 | 85 | 72 | 64 | 2.2 | 82 | 80 | 67 | 2.2 | 57 | 92 | 52 | 2.8 | 63 | 64 | 40 | 3.1 |
| Cerebro-spinal meningitis | 9 | 27 | 3 | 3.1 | 6 | 50 | 3 | 2.5 | 10 | 30 | 3 | 3.4 | 0 | 0 | 0 | 0 | 3 | 36 | 1 | 3.3 |
| Cholera infantum | 33 | 62 | 20 | 2.8 | 18 | 42 | 8 | 3.0 | 20 | 48 | 10 | 2.8 | 7 | 100 | 7 | 3.5 | 17 | 45 | 8 | 2.8 |
| Cholera morbus | 25 | 57 | 14 | 3.8 | 41 | 39 | 17 | 2.5 | 29 | 58 | 18 | 2.1 | 7 | 56 | 4 | 3.0 | 18 | 46 | 8 | 3.3 |
| Consumption, pulmonary | 53 | 82 | 43 | 3.6 | 32 | 60 | 21 | 2.7 | 53 | 76 | 40 | 2.6 | 20 | 81 | 16 | 4.8 | 36 | 78 | 29 | 3.4 |
| Croup, membranous | 6 | 50 | 3 | 3.7 | 3 | 20 | 1 | 1.0 | 8 | 44 | 4 | 3.8 | 0 | 0 | 0 | 0 | 5 | 23 | 1 | 2.3 |
| Diphtheria | 25 | 57 | 14 | 3.1 | 26 | 45 | 13 | 2.0 | 20 | 39 | 8 | 1.6 | 43 | 50 | 22 | 2.3 | 13 | 60 | 8 | 2.9 |
| Diarrhea | 65 | 70 | 46 | 2.5 | 68 | 53 | 36 | 2.0 | 49 | 70 | 35 | 2.1 | 50 | 92 | 45 | 3.3 | 55 | 65 | 36 | 2.8 |
| Dysentery | 27 | 58 | 15 | 4.0 | 21 | 40 | 9 | 2.6 | 31 | 58 | 17 | 2.3 | 10 | 54 | 5 | 3.7 | 28 | 50 | 14 | 3.3 |
| Erysipelas | 32 | 42 | 14 | 4.1 | 41 | 51 | 22 | 2.7 | 35 | 49 | 17 | 2.8 | 33 | 55 | 17 | 4.7 | 21 | 42 | 9 | 3.0 |
| Fever, Intermittent | 2 | 29 | 0.5 | 3.5 | 24 | 45 | 12 | 2.0 | 24 | 65 | 16 | 2.6 | 37 | 88 | 32 | 3.7 | 39 | 63 | 24 | 2.4 |
| Fever, Remittent | 2 | 50 | 0.7 | 4.0 | 41 | 57 | 24 | 1.9 | 12 | 48 | 5 | 2.8 | 7 | 33 | 2 | 4.0 | 45 | 74 | 33 | 2.8 |
| Fever, Typhoid (enteric) | 46 | 67 | 31 | 3.0 | 12 | 81 | 10 | 2.3 | 18 | 50 | 9 | 2.7 | 0 | 0 | 0 | 0 | 12 | 64 | 8 | 2.7 |
| Fever, typho-malarial | 2 | 44 | 1 | 2.0 | 15 | 40 | 6 | 2.6 | 12 | 54 | 7 | 1.8 | 3 | 20 | 1 | 4.0 | 17 | 37 | 6 | 4.1 |
| Influenza | 51 | 77 | 41 | 2.1 | 38 | 56 | 22 | 2.0 | 69 | 75 | 51 | 1.7 | 73 | 87 | 63 | 1.5 | 60 | 77 | 46 | 2.1 |
| Kidney, inflammation of | 28 | 55 | 15 | 3.7 | 35 | 43 | 15 | 2.5 | 47 | 56 | 26 | 3.1 | 57 | 82 | 47 | 4.4 | 29 | 66 | 19 | 2.8 |
| Measles | 12 | 63 | 7 | 2.4 | 35 | 63 | 21 | 1.9 | 22 | 58 | 13 | 2.5 | 10 | 40 | 3 | 2.0 | 16 | 41 | 7 | 2.8 |
| Neuralgia | 68 | 71 | 49 | 2.9 | 76 | 81 | 62 | 1.9 | 76 | 73 | 55 | 2.3 | 67 | 82 | 55 | 2.4 | 68 | 73 | 50 | 2.4 |
| Pleuritis | 26 | 62 | 17 | 3.6 | 26 | 35 | 10 | 2.8 | 43 | 57 | 25 | 3.1 | 33 | 48 | 16 | 4.8 | 40 | 53 | 22 | 3.4 |
| Pneumonia | 44 | 62 | 28 | 3.9 | 59 | 54 | 32 | 2.5 | 61 | 50 | 29 | 2.6 | 17 | 55 | 9 | 4.4 | 39 | 57 | 22 | 3.5 |
| Puerperal fever | 25 | 39 | 10 | 3.8 | 9 | 54 | 5 | 2.0 | 18 | 31 | 6 | 3.4 | 10 | 38 | 4 | 3.7 | 4 | 42 | 2 | 3.0 |
| Rheumatism | 64 | 78 | 51 | 3.2 | 79 | 64 | 52 | 2.2 | 92 | 81 | 75 | 1.9 | 60 | 95 | 56 | 2.4 | 69 | 80 | 55 | 3.0 |
| Scarlatina | 35 | 65 | 23 | 3.3 | 24 | 46 | 9 | 1.8 | 14 | 37 | 5 | 2.7 | 13 | 59 | 8 | 4.0 | 19 | 60 | 11 | 4.0 |
| Small-pox | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tonsillitis | 64 | 78 | 52 | 2.8 | 71 | 52 | 39 | 2.2 | 80 | 73 | 57 | 2.3 | 60 | 81 | 48 | 3.8 | 70 | 67 | 46 | 2.7 |
| Whooping-cough | 16 | 68 | 11 | 2.4 | 18 | 47 | 7 | 1.8 | 12 | 38 | 5 | 2.7 | 7 | 83 | 2 | 3.0 | 13 | 37 | 5 | 4.1 |

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* For counties in each division see Exhibit I, page 87. b, c, d, e. See foot-notes with these marks in Table 2, page 101.

## TABLE 4.—CONCLUDED.

| Diseases. | Northern Central Division.* | | | | Bay and Eastern Division * | | | | Central Division.* | | | | Southwestern Div.* | | | | Southern Central Division.* | | | | Southeastern Div.* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Per cent of Observers Reporting Presence of, b | Av. per cent of Weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Per cent of Observers Reporting Presence of b | Av. per cent of Weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Per cent of Observers Reporting Presence of, b | Av. per cent of Weeks Reported Present where present, c | Per cent of Reports Stating Presence of, d | Av. order of Prevalence where Present, e | Per cent of Observers Reporting Presence of, b | Av. per cent of Weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Per cent of Observers Reporting Presence of, b | Av. per cent of Weeks Reported Present where Present. c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e | Per cent of Observers Reporting Presence of b | Av. per cent of Weeks Reported Present where Present, c | Per cent of Reports Stating Presence of, d | Av. Order of Prevalence where Present, e |
| Av. for Tab. Dis. Rep. Present | 33 | 63 | 21 | 3.3 | 29 | 66 | 19 | 3.0 | 31 | 64 | 20 | 3.1 | 33 | 63 | 21 | 3.1 | 30 | 67 | 20 | 3.4 | 29 | 57 | 17 | 2.2 |
| Brain, Inflammation of | 0 | 0 | 0 | 0 | 5 | 24 | 1 | 5.0 | 8 | 41 | 3 | 5.7 | 6 | 43 | 3 | 3.5 | 7 | 33 | 2 | 5.0 | 5 | 32 | 2 | 2.2 |
| Bowels, Inflammation of | 24 | 38 | 9 | 4.9 | 28 | 49 | 14 | 4.3 | 27 | 51 | 15 | 4.0 | 24 | 39 | 10 | 4.0 | 19 | 45 | 9 | 5.3 | 19 | 35 | 7 | 2.1 |
| Bronchitis | 79 | 61 | 49 | 3.1 | 69 | 76 | 52 | 2.7 | 74 | 76 | 57 | 2.6 | 73 | 71 | 53 | 2.5 | 70 | 74 | 52 | 2.6 | 76 | 65 | 50 | 2.0 |
| Cerebro-spinal Meningitis | 6 | 25 | 2 | 3.5 | 4 | 39 | 2 | 4.6 | 7 | 41 | 3 | 5.3 | 7 | 26 | 2 | 3.4 | 3 | 41 | 1 | 6.5 | 0 | 0 | 0 | 0 |
| Cholera Infantum | 21 | 47 | 10 | 5.1 | 21 | 61 | 13 | 3.0 | 14 | 43 | 6 | 3.9 | 28 | 57 | 16 | 3.4 | 14 | 55 | 8 | 4.2 | 9 | 38 | 3 | 2.0 |
| Cholera Morbus | 26 | 57 | 15 | 3.2 | 26 | 48 | 13 | 2.7 | 24 | 50 | 12 | 3.6 | 32 | 56 | 18 | 3.6 | 29 | 52 | 15 | 3.8 | 25 | 37 | 10 | 2.0 |
| Consumption, Pulmonary | 32 | 82 | 26 | 5.5 | 52 | 89 | 46 | 3.0 | 48 | 81 | 38 | 3.9 | 57 | 70 | 41 | 3.5 | 44 | 84 | 37 | 4.3 | 51 | 80 | 41 | 2.0 |
| Croup, Membranous | 3 | 25 | 1 | 1.0 | 5 | 38 | 2 | 2.5 | 6 | 30 | 2 | 4.9 | 8 | 53 | 5 | 4.6 | 3 | 26 | 1 | 6.9 | 4 | 36 | 1 | 2.2 |
| Diphtheria | 6 | 57 | 3 | 2.5 | 24 | 68 | 16 | 3.6 | 9 | 43 | 4 | 3.4 | 8 | 47 | 4 | 3.6 | 7 | 56 | 4 | 6.2 | 8 | 44 | 3 | 2.3 |
| Diarrhea | 71 | 66 | 47 | 3.0 | 61 | 64 | 39 | 2.4 | 63 | 64 | 41 | 2.7 | 61 | 63 | 39 | 2.7 | 65 | 66 | 44 | 2.8 | 53 | 58 | 31 | 2.1 |
| Dysentery | 24 | 32 | 7 | 3.9 | 23 | 60 | 14 | 2.7 | 22 | 57 | 13 | 3.9 | 26 | 49 | 13 | 3.5 | 28 | 58 | 17 | 4.4 | 20 | 36 | 7 | 2 1 |
| Erysipelas | 50 | 43 | 22 | 4.3 | 26 | 43 | 11 | 3.1 | 28 | 48 | 13 | 4.3 | 37 | 52 | 19 | 3.8 | 26 | 45 | 11 | 5.0 | 30 | 50 | 15 | 2.4 |
| Fever, Intermittent | 88 | 67 | 59 | 2.1 | 21 | 52 | 11 | 3.3 | 45 | 62 | 28 | 3.0 | 47 | 66 | 31 | 3.3 | 42 | 70 | 30 | 3.2 | 44 | 47 | 20 | 2 1 |
| Fever, Remittent | 56 | 60 | 35 | 2.7 | 19 | 61 | 11 | 3.2 | 31 | 64 | 21 | 2.5 | 31 | 66 | 21 | 3.5 | 33 | 65 | 22 | 3.3 | 30 | 41 | 12 | 1.9 |
| Fever, Typhoid (enteric) | 3 | 40 | 2 | 2.0 | 23 | 67 | 15 | 3.4 | 11 | 54 | 6 | 2.9 | 13 | 59 | 8 | 3.1 | 10 | 64 | 7 | 4.3 | 9 | 55 | 5 | 1.8 |
| Fever, Typho-malarial | 3 | 25 | 1 | 2 0 | 15 | 52 | 8 | 3.1 | 7 | 41 | 3 | 3.7 | 8 | 51 | 4 | 2.9 | 8 | 55 | 4 | 5.5 | 10 | 44 | 4 | 2.1 |
| Influenza | 56 | 69 | 41 | 1.7 | 45 | 76 | 35 | 1.6 | 54 | 74 | 41 | 2.2 | 62 | 75 | 47 | 2.0 | 65 | 73 | 48 | 2.3 | 61 | 68 | 42 | 1.6 |
| Kidney, Inflammation of | 15 | 43 | 7 | 4.4 | 20 | 52 | 10 | 3.7 | 33 | 56 | 19 | 3.9 | 37 | 52 | 20 | 3.1 | 21 | 63 | 13 | 4.9 | 33 | 67 | 22 | 2.7 |
| Measles | 12 | 47 | 6 | 1.3 | 10 | 59 | 6 | 3.3 | 6 | 40 | 2 | 3.9 | 22 | 58 | 13 | 2.6 | 14 | 53 | 7 | 3.2 | 16 | 46 | 8 | 2.5 |
| Neuralgia | 82 | 75 | 62 | 3.1 | 71 | 80 | 57 | 2.4 | 82 | 76 | 62 | 2.7 | 77 | 73 | 56 | 2 6 | 80 | 76 | 61 | 2.4 | 70 | 60 | 42 | 2.8 |
| Pleuritis | 32 | 38 | 12 | 4.3 | 24 | 54 | 13 | 3.9 | 28 | 53 | 16 | 3.6 | 27 | 48 | 14 | 3.9 | 21 | 54 | 12 | 4.6 | 23 | 36 | 9 | 3.2 |
| Pneumonia | 38 | 72 | 28 | 4.6 | 32 | 59 | 19 | 3.5 | 36 | 59 | 22 | 3.5 | 37 | 51 | 19 | 3.7 | 38 | 61 | 24 | 4.2 | 29 | 38 | 11 | 2.5 |
| Puerperal Fever | 26 | 46 | 13 | 5.9 | 8 | 33 | 3 | 4.1 | 6 | 41 | 2 | 4.6 | 12 | 34 | 4 | 3.5 | 4 | 31 | 1 | 3.2 | 7 | 57 | 4 | 3.1 |
| Rheumatism | 68 | 93 | 63 | 2.6 | 77 | 78 | 61 | 2.7 | 85 | 79 | 68 | 2.5 | 88 | 81 | 72 | 2.4 | 85 | 78 | 67 | 2.6 | 80 | 79 | 63 | 2.2 |
| Scarlatina | 18 | 48 | 9 | 4.2 | 20 | 61 | 13 | 4.1 | 15 | 42 | 6 | 3.3 | 14 | 57 | 8 | 3.2 | 23 | 51 | 12 | 4.1 | 17 | 44 | 8 | 2.2 |
| Small-pox | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 55 | 1 | 7.0 | 2 | 25 | 0.5 | 3.3 |
| Tonsillitis | 76 | 77 | 59 | 2.5 | 67 | 66 | 44 | 3,0 | 74 | 64 | 48 | 2.8 | 71 | 64 | 46 | 3.0 | 75 | 71 | 54 | 2.9 | 69 | 57 | 39 | 2.4 |
| Whooping-cough | 15 | 55 | 8 | 2.8 | 14 | 64 | 10 | 2.1 | 20 | 56 | 11 | 2.5 | 17 | 57 | 10 | 3.3 | 15 | 63 | 10 | 4.2 | 9 | 50 | 4 | 2.7 |

* For counties in each division see Exhibit I, page 87. b, c, d, e. See foot-notes with these marks in Table 2, page 101.

## DISEASES IN MICHIGAN, ARRANGED IN ORDER OF PREVALENCE, THOSE WHICH CAUSE MOST SICKNESS FIRST.

EXHIBIT A.—*Order of Prevalence of twenty-eight diseases in Michigan, in the period of thirteen years 1881–1893, and in each of those years, and the average for the twelve years 1881–1892, judging from the "Per Cent of Reports," which stated the presence of each of the diseases, in connection with the reported "Order of Prevalence" when and where each disease was present. (The method of rating diseases for this Exhibit is described and illustrated in a "Compiling Table" on pages 122 and 123 of the Annual Report for 1890.)*

| Order, 1881-92. | Diseases arranged in order of greatest prevalence. | Average order, 1881-92. | 1893. | 1892. | 1891. | 1890. | 1889. | 1888. | 1887. | 1886. | 1885 | 1884. | 1883. | 1882. | 1881. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Rheumatism | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 4 | 4 | 2 |
| 2 | Neuralgia | 2 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 4 |
| 3 | Bronchitis | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 3 |
| 4 | Intermittent fever | 4 | 7 | 7 | 8 | 8 | 5 | 4 | 5 | 4 | 2 | 3 | 1 | 1 | 1 |
| 5 | Consumption, pul. | 6 | 8 | 9 | 7 | 6 | 6 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 7 |
| 6 | Diarrhea | 6 | 6 | 5 | 5 | 5 | 4 | 6 | 6 | 7 | 7 | 6 | 6 | 7 | 6 |
| 7 | Tonsillitis | 7 | 5 | 6 | 6 | 7 | 7 | 7 | 7 | 6 | 6 | 7 | 7 | 9 | 8 |
| 8 | Influenza | 7 | 3 | 4 | 1 | 4 | 8 | 8 | 8 | 8 | 8 | 9 | 8 | 8 | 9 |
| 9 | Remittent fever | 8 | 9 | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 8 | 9 | 6 | 5 |
| (10) | (The Average Disease) | 10 | 10 | 9 | 10 | 9 | 10 | 11 | 11 | 10 | 10 | 10 | 11 | 11 | 11 |
| 10 | Pneumonia | 10 | 12 | 11 | 13 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| 11 | Inflam. of kidney | 14 | 16 | 12 | 14 | 15 | 14 | 16 | 15 | 13 | 12 | 11 | ----- | ----- | ----- |
| 12 | Erysipelas | 14 | 21 | 21 | 19 | 15 | 12 | 11 | 11 | 11 | 11 | 12 | 12 | 15 | 17 |
| 13 | Cholera morbus | 14 | 13 | 14 | 12 | 12 | 15 | 15 | 12 | 14 | 15 | 15 | 15 | 16 | 14 |
| 14 | Whooping-cough | 14 | 11 | 10 | 10 | 13 | 11 | 20 | 19 | 12 | 13 | 13 | 19 | 13 | 19 |
| 15 | Dysentery | 15 | 17 | 17 | 17 | 14 | 13 | 13 | 13 | 15 | 19 | 14 | 13 | 17 | 15 |
| 16 | Typho-mal. fever | 16 | 22 | 22 | 20 | 19 | 17 | 14 | 14 | 16 | 14 | 17 | 14 | 12 | 13 |
| 17 | Measles | 17 | 10 | 16 | 11 | 11 | 22 | 12 | 16 | 22 | 25 | 23 | 11 | 20 | 11 |
| 18 | Cholera infantum | 17 | 15 | 15 | 15 | 17 | 18 | 18 | 18 | 17 | 18 | 18 | 17 | 19 | 16 |
| 19 | Pleuritis | 18 | 20 | 19 | 18 | 18 | 16 | 17 | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| 20 | Diphtheria | 19 | 18 | 18 | 23 | 23 | 24 | 23 | 20 | 19 | 16 | 20 | 18 | 11 | 12 |
| 21 | Scarlet fever | 19 | 19 | 13 | 22 | 22 | 21 | 22 | 22 | 20 | 20 | 19 | 16 | 14 | 20 |
| 22 | Inflam. of bowels | 20 | 23 | 23 | 21 | 21 | 19 | 19 | 17 | 18 | 17 | 21 | 20 | 21 | 21 |
| 23 | Typhoid fever (ent.) | 20 | 14 | 20 | 16 | 20 | 20 | 21 | 21 | 21 | 21 | 22 | 21 | 18 | 18 |
| 24 | Puerperal fever | 23 | 24 | 26 | 25 | 24 | 23 | 24 | 23 | 24 | 24 | 16 | 24 | 22 | 24 |
| 25 | Inflam. of brain | 25 | 26 | 25 | 26 | 27 | 27 | 27 | 24 | 23 | 22 | 24 | 22 | 23 | 25 |
| 26 | Membranous croup | 25 | 25 | 27 | 24 | 25 | 26 | 26 | 25 | 25 | 23 | 26 | 23 | 25 | 23 |
| 27 | Cerebro-spl. men. | 25 | 27 | 24 | 27 | 26 | 25 | 25 | 26 | 26 | 26 | 25 | 25 | 24 | 22 |
| 28 | Small-pox | 27 | 28 | 28 | 28 | 28 | 28 | 28 | 27 | 27 | 27 | 27 | 26 | 26 | 26 |

## DISEASES WHICH CAUSE MOST SICKNESS IN MICHIGAN.

This is shown in this Report in Exhibit A, and more specifically in Exhibit VI., in this Report, and in similar exhibits in previous Reports. The question is differently answered in different years. For many years after the compilation of weekly reports was begun, intermittent fever appeared to be the leading cause of sickness in Michigan.

By Exhibit A, one may see that in the years 1881–3 intermittent fever, in the years 1884–5 neuralgia, in the years 1886–90 rheumatism, in 1891 influenza, in 1892 neuralgia, and in 1893 rheumatism appear to have caused most sickness in Michigan. This does not necessarily imply that there was an increase in rheumatism or neuralgia, because one disease *may* exhibit a higher relative order of prevalence on account of some other disease or diseases having been actually lessened in prevalence.

The "Average Disease" of those reported, is included in Exhibit A, as a standard by which to judge the fluctuations. It may be seen that in 1890, the "Average Disease" was higher (9) by one-tenth, than the average (10) of a long series of years; in 1891 it was lowered to the average; and in 1892 it was again higher by one-tenth than the average, and in 1893 it was again lowered to the average.

In this connection it should be stated that the average number of diseases reported on each card has gradually decreased for the past ten years. This is shown in Exhibit B, as follows:—

EXHIBIT B.—*Stating for each of the ten years 1884–1893, the number of card reports received, the total number of disease reports and the average number of diseases reported on each card; also the averages for the 9 years, 1884–1892.*

| Year. | Number of card reports received. | Number of disease reports. | Av. number of diseases on each card. |
|---|---:|---:|---:|
| 1884 | 3,957 | 31,466 | 7.91 |
| 1885 | 5,108 | 35,752 | 7.00 |
| 1886 | 5,583 | 38,640 | 6.92 |
| 1887 | 4,896 | 33,048 | 6.75 |
| 1888 | 5,047 | 33,270 | 6.59 |
| 1889 | 5,000 | 32,612 | 6.52 |
| 1890 | 4,939 | 33,934 | 6.87 |
| 1891 | 4,291 | 28,741 | 6.70 |
| 1892 | 5,281 | 31,269 | 5.92 |
| Av. for the 9 years 1884-1892 | 4,900 | 33,192 | 6.77 |
| 1893 | 5,858 | 32,723 | 5.59 |

In 1890 rheumatism, neuralgia, bronchitis and influenza in order named, headed the list. In 1891 influenza, rheumatism, neuralgia and bronchitis, headed the list. In 1892 neuralgia, rheumatism, bronchitis and influenza and in 1893 rheumatism, neuralgia, influenza and bronchitis in order named, appear to have caused most sickness in Michigan.

Nearly the same diseases appear above the average line each year. Pneumonia has appeared in this exhibit tenth in order for eleven years in succession, ending with 1890, and dropped to thirteenth in 1891, rising in 1892, to eleventh and in 1893 to twelfth in order. Some of the diseases of minor importance vary considerably in their order. Whooping-cough, for example, in 1881 and 1883 was nineteenth in order, and rose to twelfth in order in 1886, and dropped to nineteenth in 1887, to twentieth in 1888, and rose to eleventh in 1889, and dropped to thirteenth in 1890, and was tenth in 1891 and 1892 and eleventh in 1893.

Exhibit VII. supplies data relative to what diseases caused most sickness in 1893 in each of several geographical divisions of Michigan. It may be seen that there is evidence that there are very great differences in the different parts of the State. Further evidence is very desirable, however, in order to reach conclusions on this important subject. The exhibit will be found of great interest to those who study it carefully, and in connection with previous reports.

The lines for 1893 in Exhibit XIII., are graphically represented in Diagrams 1, page 89; 2, page 125; 3, page 127, and 4 on a subsequent page.

EXHIBIT VI.—*Diseases from which there seems to have been the Most Sickness in Michigan in 1893, as indicated by the Per Cent of Weekly Reports Stating Presence of the Diseases, as studied in connection with the Average Order of Prevalence of said Diseases when Reported Present; also Order, Per Cent of Reports, and Average Order for the same Diseases in 1892, 1891, 1890, and 1889.*

| | 1893. | | | | 1892. | | | 1891. | | | 1890. | | | 1889. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Order.* | Diseases in Order of Apparent Amount of Sickness in 1893, Most Prevalent Disease First. | Per Cent of Reports Stating Presence of. *d* | Av. Order of Prevalence when Present. *e* | Order.* | Per Cent of Reports Stating Presence of. *d* | Av. Order of Prevalence when Present. *e* | Order.* | Per Cent of Reports Stating Presence of. *d* | Av. Order of Prevalence when Present. *e* | Order.* | Per Cent of Reports Stating Presence of. *d* | Av. Order of Prevalence when Present. *e* | Order.* | Per Cent of Reports Stating Presence of. *d* | Av. Order of Prevalence when Present. *e* |
| More sickness than Average for 28 Diseases. | 1 | Rheumatism | 64 | 2.6 | 2 | 64 | 2.7 | 2 | 69 | 2.9 | 1 | 71 | 2 9 | 1 | 65 | 2.8 |
| | 2 | Neuralgia | 57 | 2.5 | 1 | 61 | 2.5 | 3 | 66 | 2.8 | 2 | 67 | 2.7 | 2 | 63 | 2.6 |
| | 3 | Influenza | 43 | 2.0 | 4 | 42 | 2.1 | 1 | 55 | 2.0 | 4 | 53 | 2.2 | 8 | 32 | 2.4 |
| | 4 | Bronchitis | 53 | 2.5 | 3 | 54 | 2.6 | 4 | 60 | 2.7 | 3 | 65 | 2.6 | 3 | 58 | 2.7 |
| | 5 | Tonsillitis | 49 | 2.8 | 6 | 48 | 2.9 | 6 | 49 | 3.3 | 7 | 50 | 3.4 | 7 | 46 | 3.3 |
| | 6 | Diarrhea | 40 | 2.6 | 5 | 43 | 2.6 | 5 | 47 | 2.7 | 5 | 44 | 2.9 | 4 | 45 | 2.8 |
| | 7 | Intermittent Fever | 24 | 2.9 | 7 | 27 | 3.0 | 8 | 36 | 3.2 | 8 | 41 | 2.9 | 5 | 43 | 2.6 |
| | 8 | Consumption, Pul. | 38 | 3.5 | 9 | 38 | 3.7 | 7 | 49 | 3.8 | 6 | 52 | 3.5 | 6 | 48 | 3.5 |
| | 9 | Remittent Fever | 18 | 2.9 | 8 | 21 | 2.9 | 9 | 28 | 3.3 | 9 | 27 | 3.2 | 9 | 30 | 3.2 |
| | (10) | Average | 20 | 3.3 | 9 | 21 | 3.1 | (10) | 25 | 3.3 | (9) | 25 | 3.3 | (10) | 23 | 3.3 |
| Less than said Average. | 10 | Measles | 7 | 2.8 | 16 | 4 | 3.3 | 11 | 10 | 3.0 | 11 | 12 | 3.0 | 28 | 6 | 3.5 |
| | 11 | Whooping-Cough | 9 | 3.0 | 10 | 10 | 3.0 | 10 | 9 | 2.9 | 13 | 9 | 3.2 | 11 | 16 | 3.3 |
| | 12 | Pneumonia | 22 | 3.6 | 11 | 25 | 3.7 | 13 | 27 | 4 0 | 10 | 30 | 3.9 | 10 | 26 | 3.7 |
| | 13 | Cholera Morbus | 14 | 3.3 | 14 | 15 | 3.4 | 12 | 16 | 3.4 | 12 | 15 | 3.5 | 15 | 14 | 3.4 |
| | 14 | Typhoid Fever (ent.) | 9 | 3.2 | 20 | 9 | 3.6 | 16 | 11 | 3.5 | 20 | 8 | 3.8 | 21 | 10 | 3.9 |
| | 15 | Cholera infantum | 10 | 3.4 | 15 | 11 | 3.6 | 15 | 13 | 3.6 | 17 | 10 | 3.5 | 18 | 11 | 3.4 |

* Judging from the per cent of reports which stated presence of the diseases in connection with the order of prevalence when present. The method of rating diseases, as causes of sickness, as shown in Exhibits VI. and VII., is fully described and illustrated by a 'Compiling table" on pages 122 and 123 of the Annual Report for the year 1890.

*d* This column states what per cent the number of reports stating presence of a disease is of the whole number of reports received for the time specified, from *all observers* in the State. It combines and states in a general way, an idea of the *time* a disease was prevalent, with an idea of the area of its prevalence.

*e* The disease having the greatest number of cases was to be marked 1, in the order; the disease having the next greatest number of cases, 2; and so on. Diseases not present were to be marked 0. The numbers in this column are found by dividing the totals of the Order of Prevalence columns, in Table 3 (omitted in this report), by the number of men who reported the disease present. The column is, therefore, an average, not for all the localities represented, but only for those at which the given disease was reported present. The numbers in the "Average" lines for this column are found by dividing the sum of the totals in the Order of Prevalence columns, in Table 3, for all diseases reported present, by the sum of the numbers of men who reported the different diseases present, thus counting each man once for every disease he reported present. As a rule, small numbers in this column indicate the large prevalence of the disease, and *vice versa*; but the greater the number of diseases reported present by each observer, from week to week, the greater will be the average in this column.

EXHIBIT VII.—*In each of Eleven Geographical Divisions* of the State, the Fifteen Diseases from which there seems to have been the Greatest Amount of Sickness in 1893, as indicated by the Per Cent of Weekly Reports Stating Presence of each of 28 Leading Diseases, when Studied in connection with the Average Order of Prevalence of said diseases when reported present.*

| | Order.† | Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First. | Per Cent of Reports stating Presence of.d | Av. Order of Prevalence when Pres.e | Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First. | Per Cent of Reports stating Presence of.d | Av. Order of Prevalence when Pres.e | Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First. | Per Cent of Reports stating Presence of.d | Av. Order of Prevalence when Pres.e |
|---|---|---|---|---|---|---|---|---|---|---|
| | | UPPER PEN'LAR DIV.* | | | NORTHWESTERN DIV.* | | | NORTHERN DIVISION.* | | |
| More Sickness than Average for 28 Diseases in 1893. | 1 | Bronchitis | 56 | 2.2 | Neuralgia | 62 | 1.9 | Rheumatism | 75 | 1.9 |
| | 2 | Influenza | 41 | 2.1 | Bronchitis | 64 | 2.2 | Bronchitis | 67 | 2.2 |
| | 3 | Diarrhea | 46 | 2.5 | Rheumatism | 52 | 2.2 | Influenza | 51 | 1.7 |
| | 4 | Tonsillitis | 52 | 2.8 | Diarrhea | 36 | 2.0 | Tonsillitis | 57 | 2.3 |
| | 5 | Neuralgia | 49 | 2.9 | Tonsillitis | 39 | 2.2 | Neuralgia | 55 | 2.3 |
| | 6 | Rheumatism | 51 | 3.2 | Membranous Croup | 1 | 1.0 | Diarrhea | 35 | 2.1 |
| | 7 | Typhoid Fev. (ent.) | 31 | 3.0 | Remittent Fever | 24 | 1.9 | Typho-mal. Fever | 7 | 1.8 |
| | 8 | Typho-mal. Fever | 1 | 2.0 | Measles | 21 | 1.9 | Consumption, Pul. | 40 | 2.6 |
| | 9 | Consumption, Pul. | 43 | 3.6 | Influenza | 22 | 2.0 | Diphtheria | 8 | 1.6 |
| | 10 | Whooping-cough | 11 | 2.4 | Pneumonia | 32 | 2.5 | Cholera Morbus | 18 | 2.1 |
| | 11 | Cholera Infantum | 20 | 2.8 | Scarlet Fever | 9 | 1.8 | Pneumonia | 29 | 2.6 |
| | (11) | ---- | ---- | ---- | ---- | ---- | ---- | Average | 22 | 2.4 |
| Less than said Average. | 12 | Measles | 7 | 2.4 | Whooping-cough | 7 | 1.8 | Dysentery | 17 | 2.3 |
| | (13) | Average | 21 | 3.1 | Average | 19 | 2.2 | ---- | ---- | ---- |
| | 13 | Pneumonia | 28 | 3.9 | Diphtheria | 13 | 2.0 | Intermittent Fever | 16 | 2.6 |
| | 14 | Pleuritis | 17 | 3.6 | Intermittent Fever | 12 | 2.0 | Measles | 13 | 2.5 |
| | 15 | Cerebro-spi. Men. | 3 | 3.1 | Puerperal Fever | 5 | 2.0 | Inflam. of Kidney | 26 | 3.1 |
| | | NORTHERN CEN. DIV.* | | | WESTERN DIVISION.* | | | NORTHEASTERN DIV.* | | |
| More Sickness than Average for 28 Diseases. | 1 | Intermittent Fever | 59 | 2.1 | Influenza | 46 | 2.1 | Influenza | 63 | 1.5 |
| | 2 | Rheumatism | 63 | 2.6 | Neuralgia | 50 | 2.4 | Rheumatism | 56 | 2.4 |
| | 3 | Tonsillitis | 59 | 2.5 | Rheumatism | 55 | 3.0 | Neuralgia | 55 | 2.4 |
| | 4 | Neuralgia | 62 | 3.1 | Tonsillitis | 46 | 2.7 | Bronchitis | 52 | 2.8 |
| | 5 | Influenza | 41 | 1.7 | Intermittent Fever | 24 | 2.4 | Diarrhea | 45 | 3.8 |
| | 6 | Bronchitis | 49 | 3.1 | Diarrhea | 36 | 2.8 | Diphtheria | 22 | 2.3 |
| | 7 | Diarrhea | 47 | 3.0 | Remittent Fever | 33 | 2.8 | Tonsillitis | 48 | 3.8 |
| | 8 | Remittent Fever | 35 | 2.7 | Bronchitis | 40 | 3.1 | Inflam. of Kidney | 47 | 4.4 |
| | 9 | Puerperal Fever | 13 | 5.9 | Inflam. of Kidney | 19 | 2.8 | Intermittent Fever | 32 | 3.7 |
| | (10) | ---- | ---- | ---- | Average | 19 | 2.9 | Average | 19 | 3.8 |
| Less than said Average. | 10 | Measles | 6 | 1.3 | Membranous Croup | 1 | 2.3 | Measles | 3 | 2.0 |
| | 11 | Membranous Croup | 1 | 1.0 | Consumption, Pul. | 29 | 3.4 | Cholera Morbus | 4 | 3.0 |
| | (12) | Average | 21 | 3.3 | ---- | ---- | ---- | ---- | ---- | ---- |
| | 12 | Cholera Morbus | 15 | 3.2 | Typhoid Fev. (ent.) | 8 | 2.7 | Whooping-cough | 2 | 3.0 |
| | 13 | Typho-mal. Fever | 1 | 2.0 | Cholera Infantum | 8 | 2.8 | Cholera Infantum | 7 | 3.5 |
| | 14 | Typhoid Fev. (ent.) | 2 | 2.0 | Measles | 7 | 2.8 | Inflam. of Bowels | 18 | 4.8 |
| | 15 | Whooping-cough | 8 | 2.8 | Pleuritis | 22 | 3.4 | Dysentery | 5 | 3.7 |

*The counties in each division are stated in Exhibit I., page 87.

†Judging from the per cent of reports in connection with the "average order of prevalence where present."

d, e. Foot-notes with these Marks are on page 101.

## EXHIBIT VII.—Continued.

|  | Order.† | Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First. | Per Cent of Reports stating Presence of.[d] | Av. Order of Prevalence when Pres.[e] | Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First. | Per Cent of Reports stating Presence of.[d] | Av. Order of Prevalence when Pres.[e] | Diseases in Order of Apparent Amount of Sickness. Most Prevalent Disease First. | Per Cent of Reports stating Presence of.[d] | Av. Order of Prevalence when Pres.[e] |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  | BAY AND EASTERN DIV.* |  |  | CENTRAL DIVISION.* |  |  | SOUTHWESTERN DIV.* |  |  |
| More Sickness than Av. for 28 Diseases. | 1 | Neuralgia | 57 | 2.4 | Rheumatism | 68 | 2.5 | Rheumatism | 72 | 2.4 |
|  | 2 | Rheumatism | 61 | 2.7 | Neuralgia | 62 | 2.7 | Influenza | 47 | 2.0 |
|  | 3 | Influenza | 35 | 1.6 | Bronchitis | 57 | 2.6 | Neuralgia | 56 | 2.6 |
|  | 4 | Bronchitis | 52 | 2.7 | Influenza | 41 | 2.2 | Bronchitis | 53 | 2.5 |
|  | 5 | Diarrhea | 39 | 2.4 | Tonsillitis | 48 | 2.8 | Tonsillitis | 46 | 3.0 |
|  | 6 | Consumption, Pul. | 46 | 3.0 | Diarrhea | 41 | 2.7 | Diarrhea | 39 | 2.7 |
|  | 7 | Tonsillitis | 44 | 3.0 | Intermittent Fever | 28 | 3.0 | Consumption, Pul. | 41 | 3.5 |
|  | 8 | Whooping-cough | 10 | 2.1 | Remittent Fever | 21 | 2.5 | Measles | 13 | 2.6 |
|  | 9 | Dysentery | 14 | 2.7 | Consumption, Pul. | 38 | 3.9 | Intermittent Fever | 31 | 3.3 |
|  | (10) | ---- | ---- | ---- | ---- | ---- | ---- | Average | 21 | 3.1 |
| Less. | 10 | Cholera Morbus | 13 | 2.7 | Whooping-cough | 11 | 2.5 | Inflam. of Kidney | 20 | 3.1 |
|  | (10) | Average | 19 | 3.0 | Average | 20 | 3.1 | ---- | ---- | ---- |
|  | 11 | Cholera Infantum | 13 | 3.0 | Pneumonia | 22 | 3.5 | Remittent Fever | 21 | 3.5 |
|  | 12 | Membranous Croup | 2 | 2.5 | Typhoid Fev. (ent.) | 6 | 2.9 | Cholera Infantum | 16 | 3.4 |
|  | 13 | Erysipelas | 11 | 3.1 | Pleuritis | 16 | 3.6 | Typho-mal. Fever | 4 | 2.9 |
|  | 14 | Pneumonia | 19 | 3.5 | Inflam. of Kidney | 19 | 3.9 | Typhoid Fev. (ent.) | 8 | 3.1 |
|  | 15 | Typhoid Fev. (ent.) | 15 | 3.4 | Scarlet Fever | 6 | 3.3 | Scarlet Fever | 8 | 3.2 |
|  |  | SOUTH'N CENTRAL DIV.* |  |  | SOUTHEASTERN DIVISION.* |  |  |  |  |  |
| More Sickness than Av. for 28 Diseases. | 1 | Rheumatism | 67 | 2.6 | Influenza |  |  |  | 42 | 1.6 |
|  | 2 | Neuralgia | 61 | 2.4 | Rheumatism |  |  |  | 63 | 2.2 |
|  | 3 | Influenza | 43 | 2.3 | Bronchitis |  |  |  | 50 | 2.0 |
|  | 4 | Bronchitis | 52 | 2.6 | Consumption, Pul. |  |  |  | 41 | 2.0 |
|  | 5 | Tonsillitis | 54 | 2.9 | Neuralgia |  |  |  | 42 | 2.3 |
|  | 6 | Diarrhea | 44 | 2.8 | Diarrhea |  |  |  | 31 | 2.1 |
|  | 7 | Intermittent Fever | 30 | 3.2 | Tonsillitis |  |  |  | 39 | 2.4 |
|  | 8 | Consumption, Pul. | 37 | 4.3 | Intermittent Fever |  |  |  | 20 | 2.1 |
|  | 9 | Remittent Fever | 22 | 3.3 | Remittent Fever |  |  |  | 12 | 1.9 |
|  | (10) | Average | 20 | 3.4 | ---- |  |  |  | ---- | ---- |
| Less. | 10 | Pneumonia | 24 | 4.2 | Typhoid Fever (enteric) |  |  |  | 5 | 1.8 |
|  | (10) | ---- | ---- | ---- | Average |  |  |  | 17 | 2.2 |
|  | 11 | Cholera Morbus | 15 | 3.8 | Cholera Morbus |  |  |  | 10 | 2.0 |
|  | 12 | Measles | 7 | 3.2 | Inflam. of Bowels |  |  |  | 7 | 2.1 |
|  | 13 | Dysentery | 17 | 4.4 | Cholera Infantum |  |  |  | 3 | 2.0 |
|  | 14 | Scarlet Fever | 12 | 4.1 | Dysentery |  |  |  | 7 | 2.1 |
|  | 15 | Puerperal Fever | 1 | 3.2 | Typho-mal. Fever |  |  |  | 4 | 2.1 |

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* The counties in each division are stated in Exhibit I., page 87.

† Judging from the per cent of reports in connection with the "average order of prevalence where present."

d, e. Foot-notes with these marks are on page 101.

EXHIBIT VIII.—*Names of Stations where were made the Observations of Meteorological Conditions used in Exhibit X., and following Exhibits, relative to Sickness and Meteorological Conditions in 1893, also the Temperature, Humidity, Cloudiness, Ozone, Velocity of Wind and Atmospheric Pressure, at each Station for which Observations of the given condition are included in the summary statements relative to that condition in said exhibit.*

| Stations.* (Those of the U. S. Signal Service in italics.) | Temperature. | | Humidity. | | Per Cent of Cloudiness. | Ozone. | | Wind, Av. Velocity. | Atmospheric Pressure. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Range. | | |
| | Average Daily Range. | Average. | Relative. | Absolute. | | Day. | Night. | | Monthly. | Av. Daily. | Average. |
| Number of Stations included in Average | 15 | 9 | 7 | 7 | 8 | 5 | 5 | 8 | 8 | 8 | 8 |
| Average | 17.92 | 45.64 | 79 | 3.51 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| *Marquette* | 14.89 | ------ | ------ | ------ | ------ | ------ | ------ | 10.6 | ------ | ------ | ------ |
| Sault Ste. Marie | 16.98 | ------ | ------ | ------ | ------ | ------ | ------ | 9.0 | ------ | ------ | ------ |
| Traverse City | 20.53 | 43.76 | 80 | 3.25 | 59 | 6.71 | 6.52 | ------ | .982 | .223 | 29.269 |
| *Alpena* | 16.44 | ------ | ------ | ------ | ------ | ------ | ------ | 10.2 | ------ | ------ | ------ |
| Harrisville | 20.11 | 40.76 | ------ | ------ | 58 | 3.40 | 3.75 | ------ | ------ | ------ | ------ |
| *Grand Haven* | 15.49 | ------ | ------ | ------ | ------ | ------ | ------ | 10.8 | ------ | ------ | ------ |
| *Port Huron* | 16.08 | ------ | ------ | ------ | ------ | ------ | ------ | 11.2 | ------ | ------ | ------ |
| Thornville | 17.43 | 46.99 | 77 | 3.53 | 49 | 3.92 | 4.96 | ------ | .995 | .240 | 28.915 |
| Agricultural College | 21.74 | 44.98 | 81 | 3.60 | 55 | ------ | ------ | ------ | .987 | .206 | 29.019 |
| Lansing, S. B. of H. | 19.12 | 46.03 | 75 | 3.35 | 58 | 2.77 | 3.07 | 10.2 | .977 | .230 | 29.044 |
| Ann Arbor | 17.84 | 46.50 | 83 | 3.43 | 54 | 2.73 | 2.68 | 8.3 | .966 | .229 | 29.010 |
| Kalamazoo | 16.71 | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ |
| Tecumseh | 19.69 | 46.40 | ------ | ------ | ------ | ------ | ------ | ------ | .951 | .216 | 29.102 |
| Birmingham | 20.30 | 47.08 | 74 | 3.53 | 59 | ------ | ------ | ------ | .980 | .233 | 29.091 |
| Detroit | 15.42 | ------ | ------ | ------ | ------ | ------ | ------ | 11.6 | ------ | ------ | ------ |
| Battle Creek | ------ | 48.27 | 82 | 3.89 | 44 | ------ | ------ | ------ | .966 | .226 | 29.031 |

* Observations of range of temperature were made with registering thermometers read and set at the Signal Service Stations as follows:—the maximum at the morning observation, the minimum at the evening observation, at 9 P. M. at Ann Arbor, and at 7 A. M. at other stations. For the ozone observations, the test-paper was exposed from 7 A. M. to 2 P. M. for the day observations, and from 9 P. M. to 7 A. M. for the night observations. The velocity of wind was recorded by registering anemometers. These subjects are treated by months in 1893, and for previous years, in an article on Meteorological Conditions in Michigan in 1893, on pages 1-80 of this Report.

EXHIBIT IX.—*Showing Comparisons between the Averages of certain Meteorological Conditions at Stations in Michigan in 1893, with those in preceding Years. (Abstracted from Exhibit 9, page 18; Exhibit 13, page 24; Exhibit 17, page 30; Exhibit 19, page 31; Exhibit 28, page 46; Exhibit 32, page 55; Exhibits 24 and 25, page 44; Exhibit 30, page 54; Exibit 31, page 54; Exhibit 35, page 71.)*

| Meteorological Conditions. | | Av. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Temperature | In 1893 higher than Av. for 16 years, 1877–92 | | | | 1.23 | | | 3.24 | 1.60 | .64 | | 1.22 | .42 | |
| | Lower | .50 | 6.14 | 3.76 | | 1.13 | 1.52 | | | | .78 | | | .99 |
| Av. Daily Range of Temp. | In 1893 greater than Av. for 14 years, 1879–92 | | | .93 | | | | .22 | | 2.04 | .35 | .09 | .17 | 1.12 |
| | Less | .09 | .85 | | .83 | 3.08 | 1.15 | | .14 | | | | | |
| Absolute Humidity | In 1893 greater than Av. for 16 years, 1877–92 | .07 | | | .24 | 0 | | .66 | .46 | | | .20 | .05 | .03 |
| | Less | | .26 | .14 | | 0 | .08 | | | .16 | .10 | | | |
| Relative Humidity | In 1893 greater than Av. for 15 years, 1878–92 | 3 | 8 | 5 | 6 | 3 | 3 | 1 | 0 | | | 3 | 2 | 5 |
| | Less | | | | | | | | | 3 | 1 | | | |
| Rainfall | In 1893 greater than Av. for 16 years, 1877–92 | 1.70 | .11 | .20 | .14 | 2.30 | | | | | | 1.07 | | 1.14 |
| | Less | | | | | | .59 | .38 | .30 | 2.08 | .63 | | .12 | |
| Velocity of Wind | In 1893 greater than Av. for 11 years, 1882–92 | .7 | | 1.1 | 1.4 | 2.9 | .4 | .4 | .4 | 0 | .6 | 1.2 | .6 | .7 |
| | Less | | 1.1 | | | | | | | 0 | | | | |
| Cloudiness | In 1893 greater than Av. for 16 years, 1877–92 | | 8 | 0 | | 17 | 0 | | | | | | | 6 |
| | Less | 2 | | 0 | 2 | | 0 | 15 | 2 | 13 | 1 | 11 | 4 | |
| Day Ozone | In 1893 greater than Av. for 16 years, 1877–92 | .53 | .45 | .89 | .60 | .40 | .58 | .57 | .51 | 1.32 | .21 | .57 | | .38 |
| | Less | | | | | | | | | | | | .10 | |
| Night Ozone | In 1893 greater than Av. for 16 years, 1877–92 | .68 | .10 | .71 | .76 | .75 | .79 | .64 | .77 | .59 | .35 | .69 | | .76 |
| | Less | | | | | | | | | | | | .05 | |
| Atmospheric Pressure | In 1893 greater than Av. for 16 years, 1877-92 | | | | | | | | | | | | | |
| | Less | .087 | .198 | .049 | .076 | .131 | .124 | .025 | .043 | .033 | .102 | .092 | .099 | .068 |

## CLIMATE AND SICKNESS.*

Exhibit X., page 123 (and similar exhibits in previous Reports) is an attempt to learn something of the relations of bronchitis to meteorological conditions, by noting whether each meteorological condition was above or below its average for the year, in months when more or in months when less bronchitis than the average for the year was reported. The months are arranged in order according to the prevalence of bronchitis; those months in which most bronchitis was reported being placed first in the column; those in which more bronchitis than the average was reported are placed above the average line, the others below that line. The meteorological conditions for each month are printed, in the proper columns, in the line for the month. The statements being thus arranged, it is easy to see whether the temperature, the velocity of the wind, or any other condition represented, was above its annual average in months when more than the average amount of bronchitis was reported, or *vice versa.*

That the comparisons may the more readily be held in mind, propositions have been made concerning the relations of bronchitis to meteorological conditions, grouping the conditions into two classes. The letters *a* and *b* in the Exhibit, mark exceptions to these propositions. It is not supposed that the propositions are in every case true concerning every disease; but the propositions serve to bring out the evidence of the exhibit on the subject in question. This evidence is appreciated by noting the number and force of the exceptions to the propositions, and also whether the exception is explained by facts shown in other columns. A summary of the evidence is presented in Exhibit XXV., near the close of this article.

Exhibits and propositions similar to those relative to bronchitis, but relating to other diseases, are given on following pages. The propositions are differently stated for the summer diseases (beginning with the exhibit on diarrhea) and for the winter diseases (beginning with that on bronchitis), but they are not changed to fit the individual diseases under each class.

## RELATIONS OF BRONCHITIS TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis, these conditions were **less** than the average for the year. In Exhibit X, page 123, the letter *a* marks exceptions to this proposition for the year 1893.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of bronchitis, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere and the average daily pressure of the atmosphere were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of bronchitis these conditions were **greater** than the average for the year. In Exhibit X., page 123, the letter *b* marks exceptions to this proposition for months in 1893.

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* The remarks under this head are applicable, also, by changing the name of the diseases to diseases treated in Exhibits XII., XIV., XV., XVI. and XVII., on the following pages. The meteorological data are from places indicated in Exhibit VIII., page 118.

PROPOSITION 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 2, it is true also that the quantity of vapor inhaled daily was **less** than the average, and the quantity exhaled daily in excess of that inhaled was **greater** than the average in months when **more** than the average per cent of reports stated presence of bronchitis; and that **more** vapor was inhaled and a **less** excess exhaled daily in months when the per cent of reports stating presence of bronchitis was **less** than the average.

Proposition 3 also holds true in relation to pneumonia, membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis and pulmonary consumption, treated in Exhibits XII., XIV., XV., XVI. and XVII., on following pages.

What per cent of weekly reports received in 1893 stated presence of bronchitis is graphically represented by months in Diagram 1, page 89.

The evidence of Exhibit X. confirms that of similar exhibits relating to bronchitis in previous years.

What per cent of the reports received stated presence of bronchitis by months in each of the years 1877-93; also the averages for 1877-92 and 1886-92, and a comparison of 1893, with those averages are shown in Exhibit XI., page 122.

### RELATIONS OF PNEUMONIA AND OTHER "COLD WEATHER" DISEASES TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption or average disease), the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of the reports stated the presence of pneumonia (or of the other diseases named), these conditions were **less** than the average for the year. In Exhibits XII.-XXVIII., on page 124 and the following pages, the letter *a* marks exceptions to this proposition for the year 1893.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of pneumonia (or of membranous croup, diphtheria, tonsillitis, influenza, scarlet fever, rheumatism, neuralgia, pleuritis, pulmonary consumption, or average disease), the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere, were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of pneumonia (or of the other diseases named), these conditions were **greater** than the average for the year. In Exhibits XII.-XXVIII., on page 124 and following pages, the letter *b* marks exceptions to this proposition for the year 1893.

What per cent of the weekly reports received in 1893 stated presence of pneumonia is graphically represented by months in Diagram 1, page 89. What per cent of weekly reports received stated presence of pneumonia, and of the other diseases mentioned in the two preceding propositions by months in the years 1892 and 1893, is stated in Exhibit XIII., page 126, where are also given an average for the sixteen years, 1877–1892, also for the seven years, 1886–1892, and a comparison of 1893 with those averages.

From Exhibit XIII., it may be seen that pneumonia was considerably less in 1893 than the average for sixteen years, 1877–92, and also less in each month of 1893, than for the corresponding months of the sixteen years, 1877–1892.

The average temperature was slightly lower in 1893, than the average for the sixteen years, 1877–92. It was also lower in each month of 1893, except in March, June, July, August, October and November, than the average in corresponding months in the sixteen years, 1877–1892.

The absolute humidity was slightly more in 1893, than the average for the sixteen years, 1877–92. It was also more in each month of 1892, except January, February, May, August and September, than the average in corresponding months in the sixteen years, 1877–1892. In April it was the same.

The relative humidity was more for the year, and each month of the year 1893, except August and September, than the average for the fifteen years, 1878–1892. In July it was the same.

EXHIBIT XI.—Sickness from Bronchitis, 1877–93.—*By Year and Months for each of the sixteen years, 1877–92, and for 1893, and an Average for the sixteen years, 1877–1892, also for the seven years, 1886–1892; stating on what per cent of the Weekly Reports received Bronchitis was reported present, and comparing the Per Cents for 1893, with the Averages for corresponding months in those years.*

| Years, Etc. | Annual Av. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average 16 years, 1877–92 | 60 | 74 | 75 | 75 | 71 | 61 | 52 | 43 | 41 | 48 | 55 | 64 | 70 |
| Average 7 years, 1886–92 | 58 | 70 | 72 | 72 | 69 | 61 | 50 | 43 | 41 | 47 | 55 | 61 | 66 |
| 1877 | 55 | 76 | 72 | 72 | 65 | 45 | 31 | 25 | 22 | 87 | 48 | 71 | 77 |
| 1878 | 64 | 77 | 75 | 74 | 71 | 65 | 56 | 41 | 45 | 55 | 60 | 73 | 81 |
| 1879 | 64 | 83 | 87 | 83 | 78 | 65 | 54 | 40 | 41 | 50 | 59 | 65 | 77 |
| 1880 | 64 | 81 | 84 | 82 | 68 | 59 | 57 | 44 | 45 | 46 | 57 | 67 | 72 |
| 1881 | 62 | 86 | 86 | 80 | 78 | 62 | 53 | 38 | 37 | 44 | 44 | 66 | 68 |
| 1882 | 65 | 73 | 70 | 75 | 74 | 70 | 62 | 51 | 44 | 57 | 50 | 71 | 71 |
| 1883 | 66 | 77 | 80 | 82 | 76 | 70 | 62 | 56 | 53 | 53 | 57 | 61 | 69 |
| 1884 | 61 | 71 | 71 | 71 | 65 | 59 | 56 | 49 | 47 | 50 | 56 | 69 | 70 |
| 1885 | 56 | 73 | 74 | 76 | 73 | 56 | 52 | 44 | 39 | 45 | 51 | 58 | 64 |
| 1886 | 56 | 71 | 69 | 71 | 65 | 57 | 45 | 40 | 87 | 41 | 51 | 61 | 65 |
| 1887 | 55 | 67 | 69 | 67 | 62 | 57 | 49 | 41 | 38 | 47 | 57 | 57 | 61 |
| 1888 | 59 | 63 | 76 | 74 | 68 | 63 | 55 | 41 | 39 | 49 | 59 | 59 | 65 |
| 1889 | 58 | 65 | 68 | 69 | 68 | 61 | 50 | 49 | 44 | 51 | 57 | 64 | 62 |
| 1890 | 65 | 71 | 74 | 76 | 74 | 66 | 56 | 50 | 52 | 54 | 65 | 73 | 79 |
| 1891 | 60 | 81 | 79 | 81 | 76 | 64 | 48 | 43 | 36 | 44 | 48 | 57 | 68 |
| 1892 | 54 | 72 | 70 | 64 | 67 | 56 | 47 | 37 | 38 | 42 | 50 | 57 | 68 |
| 1893 | 53 | 67 | 67 | 62 | 64 | 54 | 42 | 35 | 34 | 39 | 48 | 61 | 62 |
| In 1893 Less than Av. 1877–92 | 7 | 7 | 8 | 13 | 7 | 7 | 10 | 8 | 7 | 9 | 7 | 3 | 8 |
| In 1893 Less than Av. 1886–92* | 5 | 3 | 5 | 10 | 5 | 7 | 8 | 8 | 7 | 8 | 7 | .... | 4 |

* This comparison is made because of change of plan of reports in May, 1885, as explained on pages 82–88.

EXHIBIT X.—BRONCHITIS.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Bronchitis, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| | BRONCHITIS. | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | | Ozone, Relative Scale of 10°. | | | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Range. | | |
| | Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where Present. †. ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled. ‖ | Exhaled in excess of that Inhaled. ¶ | Average Per Cent of Cloudiness. | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | Av. Velocity of Wind, Miles per Hour by Anemometer. | Monthly and for Year. | Av. Daily, by 3 Daily Observations.** | Average Pressure. |
| More than Av. Per Cent of Bronchitis. | Feb. | 67 | 2.2 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *b*29.124 |
| | Jan. | 67 | 2.3 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | 4.03 | *a* 9.7 | 1.110 | .253 | 28.977 |
| | Apr. | 64 | 2.2 | 16.32 | 43.19 | *a*73 | 2.77 | 1.73 | 4.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Mar. | 62 | 2.5 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *b*29.067 |
| | Dec. | 62 | 2.6 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *a* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *b*29.093 |
| | Nov. | 61 | 2.4 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *a* 3.03 | *a* 3.28 | 11.3 | 1.135 | *a* .213 | 29.059 |
| | May | 54 | 2.4 | *b*19.20 | *b*54.30 | *a* 72 | *b* 3.83 | 2.39 | 9.29 | *a* 50 | 4.18 | 4.55 | *a* 9.8 | *a* .955 | *a* .175 | 28.982 |
| Av. | | 53 | 2.5 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Bronchitis. | Oct. | 48 | 2.7 | *b*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *a* 10.6 | *a*1.256 | .225 | 29.079 |
| | June | 42 | 2.5 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | *a* 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | Sept. | 39 | 3.2 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | July | 35 | 2.7 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | Aug. | 34 | 3.1 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *a* 4.56 | *a* 4.56 | 7.6 | .489 | .123 | 29.111 |

*a* An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was greater than the average for the year; and less in months when the same condition was less than the average. See proposition 1, relating to bronchitis, page 120.

*b* An exception to the proposition that more than the average per cent of weekly reports stated presence of bronchitis in months when the meteorological condition named at the head of the column was less than the average for the year and less in months when the same condition was greater than the average for the year. See proposition 2, relating to bronchitis, page 120.

* How many stations, and what stations are represented in the statements for each meteorological subject may be seen by referring to Exhibit VIII., page 80, in which the stations are named, and a statement for the year 1893, in relation to each meteorological subject, is given for each station included in the average for that subject. In Exhibit VIII., is also stated what time the tri-daily observations were made at each station. Additional statements relative to meteorological conditions may be found in an article on the Principal Meteorological Conditions in Michigan in 1893 on pages 1-80 of this Report.

† Explanations of statements in these columns, and other statements relative to the prevalence, in 1893, of the diseases under consideration may be found in Tables 2, pages 100-109, and 4, pages 110-111, of this Report, and also in Diagrams 1 (p. 89), 2, 3, 4 and 5, on following pages. When the per cent of reports stated for any disease is the same for two months or for any month is the same as the average, the order of months in the first column of these exhibits has been determined by reference to fractional per cents.

‡ Small numbers in this column indicate great prevalence in the localities where the disease occurred, as compared with other diseases; and large numbers a less prevalence.

§ Calculated from readings of dry bulb and wet bulb thermometers.

‖ Calculated for 18 respirations per minute, of 20 cubic inches of air each.

¶ Assuming the air exhaled to be saturated with vapor at the temperature of 98° F., in which case each cubic foot of air contains 18.69 grains of vapor, and 18 respirations per minute, of 20 cubic inches of air each, make 11.68 Troy ounces of vapor exhaled daily. No correction has been made for expansion of air after it is inhaled.

** The daily range from which numbers in this column were computed is the difference between the highest and the lowest of the four observations taken during the 24 hours, namely, at 7 A. M., 2 P. M., 9 P. M. of one day, and 7 A. M. of the following day.

EXHIBIT XII.—PNEUMONIA AND MEMBRANOUS CROUP.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Pneumonia and Membranous Croup, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| | PNEUMONIA. | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | Per Cent of Weekly Reports stating Presence of. | Av. Order of Prevalence where Present. †. ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Range. | | Average Pressure. |
| | | | | | | | | | | | | | | Monthly and for Year. | Av. Daily, by 3 Daily Observations.** | |
| More than Av. Per Cent of Pneumonia. | Feb. | 36 | 3.2 | *b*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *b* 29.124 |
| | Jan. | 34 | 3.4 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *a* 4.03 | *a* 9.7 | 1.110 | .253 | 28.977 |
| | Mar. | 34 | 3.5 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *b* 29.067 |
| | Dec. | 34 | 3.9 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *a* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *b* 29.093 |
| | Apr. | 31 | 3.8 | 16.32 | 43.19 | *a* 73 | 2.77 | 1.73 | 4.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Nov. | 24 | 3.9 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *a* 3.03 | *a* 3.28 | 11.3 | 1.135 | *a* .213 | 29.059 |
| Av. | | 22 | 3.6 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Pneumonia. | May | 20 | 3.6 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | *a* 4.18 | *a* 4.55 | 9.8 | .955 | .175 | *b* 28.982 |
| | June | 12 | 3 4 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | *a* 3.98 | 4.15 | 8.2 | .591 | .188 | 29.066 |
| | Oct. | 12 | 3.6 | *b*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *a* 10.6 | *a*1.256 | .225 | 29.079 |
| | Sept. | 9 | 4.5 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | July | 8 | 3.2 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | Aug. | 7 | 3.7 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *a* 4.56 | *a* 4.56 | 7.6 | .489 | .123 | 29.111 |
| MEMBRANOUS CROUP. | | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Mem. Croup. | Feb. | 5 | 3.6 | *b*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *b* 29.124 |
| | Mar. | 4 | 3.5 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *b* 29.067 |
| | Nov. | 3 | 5.4 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *a* 3.03 | *a* 3.28 | 11.3 | 1.135 | *a* .218 | 29.059 |
| | Apr. | 2 | 3.4 | 16.32 | 43.19 | *a* 73 | 2.77 | 1.73 | 4.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| Av. | | 2 | 4.1 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | 9.69 | .227 | 29.060 |
| Less than Av. Per Cent of Membranous Croup. | Jan. | 2 | 4.4 | *b*15.05 | *b*15.23 | *a* 89 | *b* 1.19 | .74 | 10.94 | *a* 76 | *a* 4.02 | 4.03 | 9.7 | *a*1.110 | .253 | *b* 28.977 |
| | Dec. | 2 | 4.6 | *b*14.31 | *b*26.88 | *a* 88 | *b* 1.83 | 1.14 | 10.54 | *a* 80 | 3.81 | *a* 4.53 | *a* 11.7 | *a*1.313 | *a* .329 | 29.093 |
| | May | 2 | 4.8 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | *a* 4.18 | *a* 4.55 | 9.8 | .955 | .175 | *b* 28.982 |
| | Oct. | 1 | 3.3 | *b*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.85 | 47 | 3.70 | 3.91 | *a* 10.6 | *a*1.256 | .225 | 29.079 |
| | Aug. | 1 | 3.8 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *a* 4.56 | *a* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | July | 1 | 6.0 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | June | 0.2 | 5.0 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | *a* 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | Sept. | .02 | 2.0 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |

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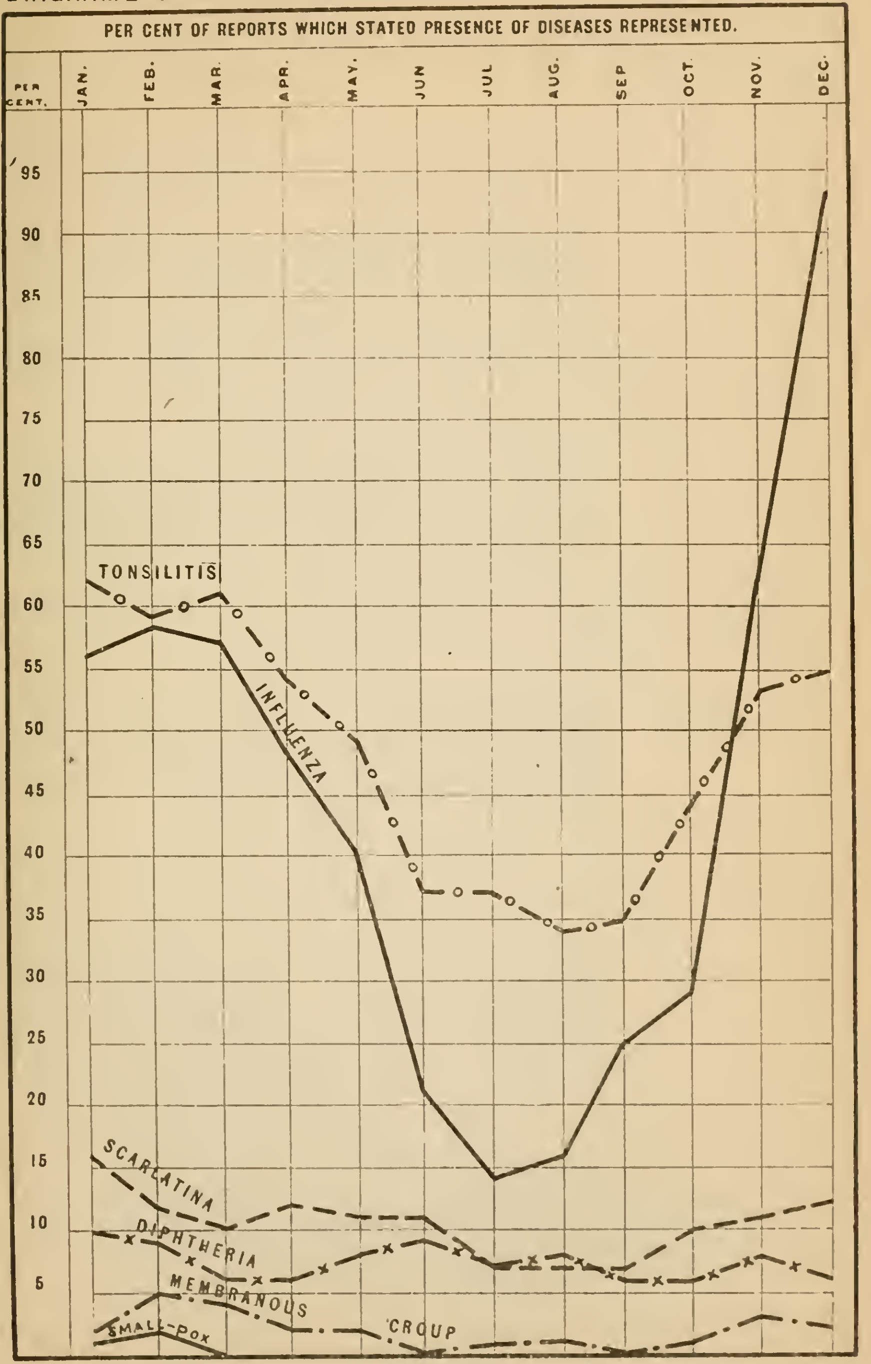
*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 123.

*a* An exception to Proposition 1, relating to Pneumonia and Membranous Croup on page 121.

*b* An exception to Proposition 2, relating to Pneumonia and Membranous Croup on page 121.

DIAGRAM 2—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1893.



[Plate 759.]

EXHIBIT XIII.—*By Year and Months for 1893 and for the preceding year, and an Average for the Sixteen Years, 1877-92.* Stating on what Per Cent of the Weekly Reports received* PNEUMONIA, MEMBRANOUS CROUP, DIPHTHERIA, RHEUMATISM, INFLUENZA, SCARLET FEVER, NEURALGIA* AND TONSILLITIS,* *were Reported Present, and Comparing the Per Cents for Months in 1889, with the Averages for Corresponding Months in those years.*†

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | | Year. | Jan. | Feb. | March | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pneumonia. | Av. 16 years, 1877-1892 | 33 | 55 | 59 | 55 | 49 | 37 | 22 | 14 | 12 | 15 | 20 | 30 | 40 | Membranous Croup. | 5 | 10 | 8 | 7 | 6 | 4 | 3 | 2 | 2 | 3 | 5 | 7 | 9 |
| | Av. 7 years, 1886-1892 | 28 | 49 | 51 | 47 | 40 | 31 | 16 | 11 | 9 | 12 | 17 | 24 | 33 | | 4 | 7 | 6 | 5 | 5 | 4 | 2 | 1.4 | 1.4 | 2 | 4 | 5 | 6 |
| | 1892 | 25 | 69 | 54 | 37 | 30 | 26 | 13 | 10 | 7 | 12 | 13 | 20 | 28 | | 3 | 7 | 9 | 3 | 4 | 4 | 2 | 2 | 1 | 2 | 2 | 4 | 5 |
| | 1893 | 22 | 34 | 36 | 34 | 31 | 20 | 12 | 8 | 7 | 9 | 12 | 24 | 34 | | 2 | 2 | 5 | 4 | 2 | 2 | 0.2 | 1 | 1 | 0.2 | 1 | 3 | 2 |
| | In 1893 Greater than Av. 1877-1892 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | -- | -- | -- | -- | -- | -- | --- | --- | --- | --- | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | 11 | 21 | 23 | 21 | 18 | 17 | 10 | 6 | 5 | 6 | 8 | 6 | 6 | | 3 | 8 | 3 | 3 | 4 | 2 | 2.8 | 1 | 1 | 3 | 4 | 4 | 7 |
| | In 1893 Greater than Av. 1886-1892‡ | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0 | 1 | | -- | -- | -- | -- | -- | -- | --- | --- | --- | --- | -- | -- | -- |
| | In 1893 Less than Av. 1886-92‡ | 6 | 15 | 15 | 13 | 9 | 11 | 4 | 3 | 2 | 3 | 5 | 0 | -- | | 2 | 5 | 1 | 1 | 3 | 2 | 1.8 | .4 | .4 | 2 | 3 | 2 | 4 |
| Diphtheria. | Av. 16 years, 1877-1892 | 16 | 21 | 18 | 15 | 15 | 13 | 11 | 11 | 12 | 13 | 20 | 22 | 21 | Rheumatism. | 68 | 72 | 72 | 74 | 75 | 72 | 68 | 61 | 58 | 61 | 67 | 70 | 72 |
| | Av. 7 years, 1886-1892 | 8 | 11 | 8 | 7 | 7 | 7 | 6 | 6 | 6 | 7 | 11 | 11 | 10 | | 68 | 71 | 70 | 73 | 74 | 72 | 69 | 61 | 59 | 63 | 68 | 68 | 70 |
| | 1892 | 7 | 8 | 3 | 6 | 10 | 7 | 6 | 4 | 5 | 6 | 9 | 10 | 13 | | 64 | 71 | 68 | 69 | 68 | 67 | 64 | 56 | 57 | 58 | 63 | 63 | 70 |
| | 1893 | 7 | 10 | 9 | 6 | 6 | 8 | 9 | 7 | 8 | 6 | 6 | 8 | 6 | | 64 | 66 | 67 | 68 | 73 | 67 | 61 | 60 | 58 | 57 | 64 | 64 | 65 |
| | In 1893 Greater than Av. 1877-1892 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | -- | -- | -- | -- | -- | -- | --- | --- | = | --- | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | 9 | 11 | 9 | 9 | 9 | 5 | 2 | 4 | 4 | 7 | 14 | 14 | 15 | | 4 | 6 | 5 | 6 | 2 | 5 | 7 | 1 | = | 4 | 3 | 6 | 7 |
| | In 1893 Greater than Av. 1886-1892‡ | -- | -- | 1 | -- | -- | 1 | 3 | 1 | 2 | -- | -- | -- | -- | | -- | -- | -- | -- | | -- | --- | --- | --- | --- | -- | -- | -- |
| | In 1893 Less than Av. 1886-92‡ | 1 | 1 | -- | 1 | 1 | -- | -- | -- | -- | 1 | 5 | 3 | 4 | | 4 | 5 | 3 | 5 | 1 | 5 | 8 | 1 | 1 | 6 | 4 | 4 | 5 |
| Influenza. | Av. 16 years, 1877-1892 | 40 | 60 | 64 | 61 | 54 | 39 | 28 | 20 | 20 | 28 | 32 | 40 | 49 | Scarlet Fever. | 15 | 19 | 19 | 19 | 18 | 16 | 14 | 11 | 10 | 11 | 14 | 15 | 15 |
| | Av. 7 years, 1886-1892 | 40 | 64 | 67 | 64 | 56 | 40 | 27 | 18 | 17 | 25 | 31 | 38 | 50 | | 10 | 12 | 11 | 12 | 12 | 11 | 9 | 6 | 6 | 7 | 11 | 11 | 11 |
| | 1892 | 42 | 97 | 92 | 77 | 56 | 29 | 20 | 15 | 17 | 23 | 22 | 34 | 53 | | 12 | 11 | 10 | 16 | 18 | 16 | 13 | 7 | 6 | 10 | 9 | 14 | 18 |
| | 1893 | 48 | 56 | 58 | 57 | 48 | 40 | 21 | 14 | 16 | 25 | 29 | 62 | 93 | | 10 | 16 | 12 | 10 | 12 | 11 | 11 | 7 | 7 | 7 | 10 | 11 | 12 |
| | In 1893 Greater than Av. 1877-1892 | 3 | -- | -- | -- | -- | 1 | -- | -- | -- | -- | -- | 22 | 44 | | -- | -- | -- | -- | -- | -- | --- | --- | --- | --- | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | -- | 4 | 6 | 4 | 6 | -- | 7 | 6 | 4 | 3 | 3 | -- | -- | | 5 | 3 | 7 | 9 | 6 | 5 | 3 | 4 | 3 | 4 | 4 | 4 | 3 |
| | In 1893 Greater than Av. 1886-1892‡ | 3 | -- | -- | -- | -- | = | -- | -- | -- | 0 | -- | 24 | 43 | | = | 4 | 1 | -- | = | = | 2 | 1 | 1 | = | -- | = | 1 |
| | In 1893 Less than Av. 1886-92‡ | -- | 8 | 9 | 7 | 8 | = | 6 | 4 | 1 | 0 | 2 | -- | -- | | = | -- | -- | 2 | = | = | --- | --- | --- | = | 1 | = | -- |
| Neuralgia. | Av. 14 years, 1879-1892 | 65 | 69 | 71 | 72 | 72 | 67 | 64 | 60 | 57 | 59 | 62 | 67 | 68 | Tonsillitis. | 48 | 59 | 60 | 59 | 54 | 47 | 40 | 33 | 32 | 37 | 45 | 54 | 59 |
| | Av. 7 years, 1886-1892 | 65 | 69 | 71 | 72 | 71 | 66 | 62 | 60 | 57 | 69 | 62 | 65 | 67 | | 47 | 58 | 58 | 59 | 55 | 47 | 39 | 32 | 31 | 36 | 45 | 53 | 58 |
| | 1892 | 61 | 73 | 75 | 72 | 71 | 62 | 57 | 54 | 53 | 53 | 56 | 59 | 62 | | 48 | 57 | 59 | 59 | 60 | 48 | 41 | 34 | 34 | 36 | 44 | 55 | 63 |
| | 1893 | 57 | 57 | 62 | 65 | 61 | 56 | 50 | 51 | 53 | 54 | 55 | 60 | 57 | | 49 | 62 | 59 | 61 | 54 | 49 | 37 | 37 | 34 | 35 | 44 | 53 | 55 |
| | In 1893 Greater than Av. 1879-1892 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | 1 | 3 | -- | 2 | = | 2 | --- | 4 | 2 | --- | -- | -- | -- |
| | In 1893 Less than Av. 1879-92 | 8 | 12 | 9 | 7 | 11 | 11 | 14 | 9 | 4 | 5 | 7 | 7 | 11 | | -- | -- | 1 | -- | = | -- | 3 | --- | --- | 2 | 1 | 1 | 4 |
| | In 1893 Greater than Av. 1886-1892‡ | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | 2 | 4 | 1 | 2 | -- | 2 | --- | 5 | 3 | --- | -- | = | -- |
| | In 1893 Less than Av. 1886-92‡ | 8 | 12 | 9 | 7 | 10 | 10 | 12 | 9 | 4 | 15 | 7 | 5 | 10 | | -- | -- | -- | -- | 1 | -- | 2 | --- | --- | 1 | 1 | = | 3 |

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* The average line for tonsillitis and neuralgia includes only the fourteen years, 1879-1892.

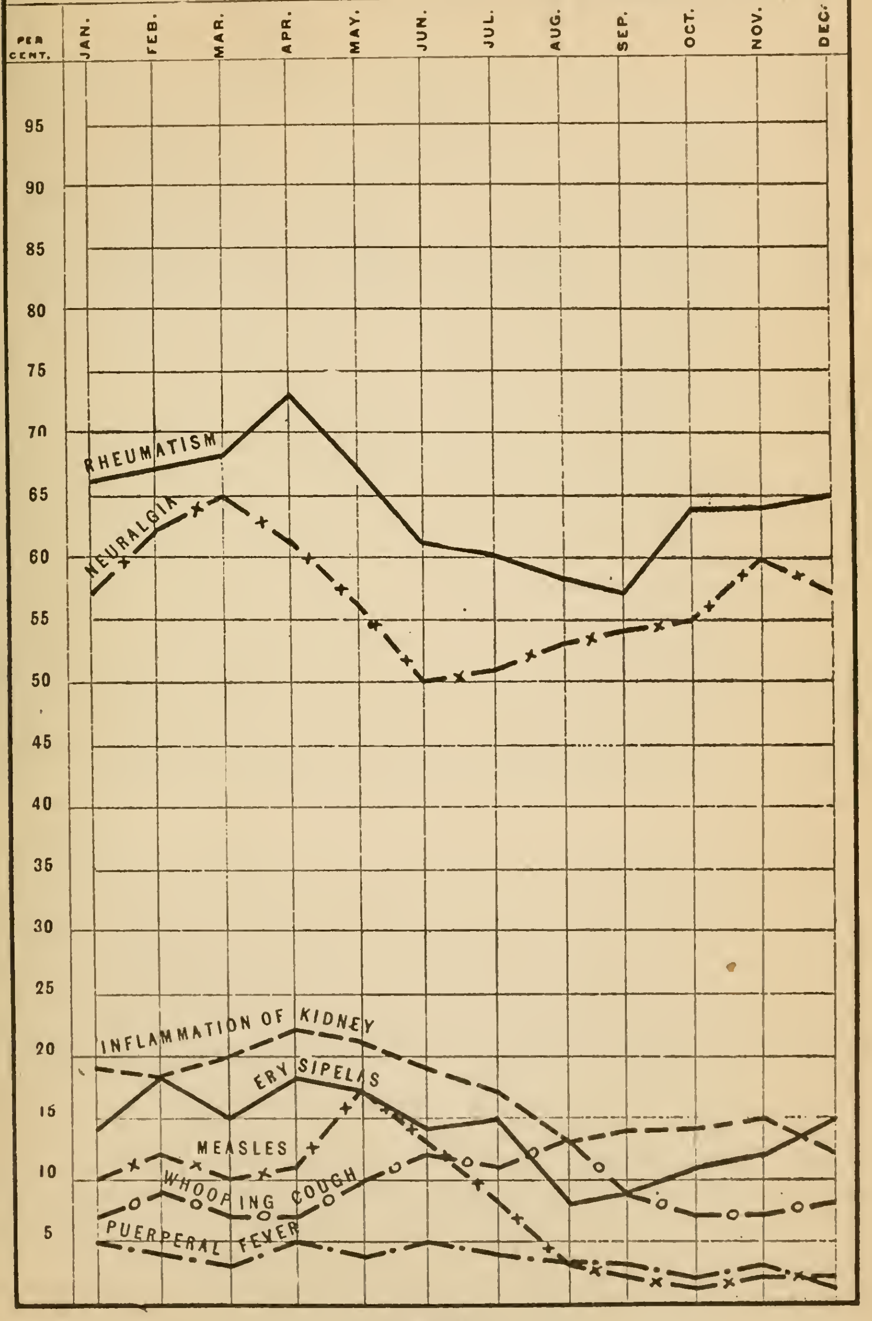
† Other statements for 1893, and months in 1893, relative to these diseases are given in Table 2, pages 100-109, and in Exhibits XII., XIV., XV. and XVI., pages 124 128, 129 and 130, where are also given for convenient comparison statements of coincident meteorological conditions.

‡ This comparison is made because of change of plan of reports in May, 1885, as explained on pages 82-3.

The lines for 1893 in Exhibit XIII. are graphically represented in Diagrams 1, page 89, 2, page 125, 3, page 127, and 4 on page 133.

DIAGRAM 3—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1893.

PER CENT OF REPORTS WHICH STATED PRESENCE OF DISEASES REPRESENTED.



[Plate 760.]

EXHIBIT XIV.—DIPHTHERIA AND TONSILLITIS.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Diphtheria and Tonsillitis, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| DIPHTHERIA. | | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where Present. †. ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute.—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Range. | | Average Pressure. |
| | | | | | | | | | | | | | | Monthly and for Year. | Av. Daily, by 8 Daily Observations.** | |
| More than Av. Per Cent of Diphtheria. | Jan. | 10 | 3.5 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *a* 4.03 | *a* 9.7 | 1.110 | .253 | 28 977 |
| | June | 9 | 3.0 | *b* 20.52 | *b* 69.05 | *a* 74 | *b* 6.12 | 3.83 | 7.85 | *a* 34 | 3.98 | *a* 4.15 | *a* 8.2 | *a* .591 | *a* .138 | *b* 29.066 |
| | Feb. | 9 | 4.0 | *b* 18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | :366 | *b* 29.124 |
| | May | 8 | 2.3 | *b* 19.20 | *b* 54.30 | *a* 72 | *b* 3.83 | 2.39 | 9.29 | *a* 50 | 4.18 | 4.55 | *a* 9.8 | *a* .955 | *a* .175 | 28.982 |
| | Aug. | 8 | 3.4 | *b* 22.12 | *b* 68.57 | *a* 70 | *b* 5.58 | 3.49 | 8.19 | *a* 30 | 4.56 | 4.56 | *a* 7.6 | *a* .489 | *a* .123 | *b* 29.111 |
| | Nov. | 8 | 3.7 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *a* 3.03 | *a* 3.28 | 11.3 | 1.135 | *a* .213 | 29.059 |
| | July | 7 | 2.9 | *b* 20.75 | *b* 72.16 | *a* 72 | *b* 6.50 | 4.06 | 7.62 | *a* 38 | *a* 3.50 | *a* 3.66 | *a* 8.2 | *a* .487 | *a* .151 | *b* 29.077 |
| Average | | 7 | 3.4 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Diphtheria. | Oct. | 6 | 3.5 | *b* 17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *a* 10.6 | *a* 1.256 | .225 | 29.079 |
| | Sept. | 6 | 3.5 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | Dec. | 6 | 3.8 | *b* 14.31 | *b* 26.88 | *a* 88 | *b* 1.83 | 1.14 | 10.54 | *a* 80 | 3.81 | *a* 4.53 | *a* 11.7 | *a* 1.313 | *a* .329 | 29.093 |
| | Apr. | 6 | 3.8 | *b* 16.32 | *b* 43.19 | 73 | *b* 2.77 | 1.73 | 4.95 | *a* 68 | *a* 3.92 | *a* 4.62 | *a* 13.2 | *a* 1.138 | *a* .288 | *b* 29.000 |
| | Mar. | 6 | 4.5 | *b* 16.61 | *b* 30.61 | *a* 84 | *b* 2.03 | 1.27 | 10.41 | *a* 56 | *a* 4.30 | *a* 4.92 | *a* 11 7 | *a* 1.066 | *a* .200 | 29.067 |
| TONSILLITIS. | | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Tonsillitis. | Jan. | 62 | 2.5 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *a* 4.03 | *a* 9.7 | 1.110 | .253 | 28,977 |
| | Mar. | 61 | 2.5 | 16.64 | 30.61 | 81 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4 92 | 11.7 | 1.066 | .200 | *b* 29.067 |
| | Feb | 59 | 2 6 | *b* 18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *b* 29.124 |
| | Dec. | 55 | 3.4 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *a* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *b* 29.093 |
| | Apr. | 54 | 2.7 | 16.32 | 43.19 | *a* 73 | 2.77 | 1.73 | 4.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Nov. | 53 | 2.9 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *a* 3.03 | *a* 3.28 | 11.3 | 1.135 | *a* .218 | 29.059 |
| | May | 49 | 2.6 | *b* 19.20 | *b* 54.30 | *a* 72 | *b* 3.83 | 2.39 | 9.29 | *b* 50 | 4.18 | 4.55 | *a* 9.8 | *a* .955 | *a* .175 | 28.982 |
| Average | | 49 | 2.8 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 51 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Tonsillitis. | Oct. | 44 | 3.0 | *b* 17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *a* 10.6 | *a* 1.256 | .225 | 29.079 |
| | July | 37 | 2.5 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | June | 37 | 2.8 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | *a* 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | Sept. | 35 | 3.3 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | Aug. | 34 | 3.3 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8 19 | 80 | *a* 4.56 | *a* 4.56 | 7.6 | .489 | .123 | 29.111 |

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 123.

*a* An exception to Proposition 1, relating to Diphtheria and Tonsillitis, on page 121.

*b* An exception to Proposition 2, relating to Diphtheria and Tonsillitis, on page 121.

EXHIBIT XV.—INFLUENZA AND SCARLET FEVER.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Influenza and Scarlet Fever, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| | INFLUENZA. | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | Per Cent of Weekly Reports stating Presence of. | Av. Order of Prevalence where Present. †, ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Range. | | Average Pressure. |
| | | | | | | | | | | | | | | Monthly and for Year. | Av. Daily, by 3 Daily Observations.** | |
| More than Av. Per Cent of Influenza. | Dec. | 93 | 1.1 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *a* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *b*29.093 |
| | Nov. | 62 | 1.7 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *a* 3.03 | *a* 3.28 | 11.3 | 1.135 | *a* .213 | 29.059 |
| | Feb. | 58 | 1.9 | *b*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *b*29.124 |
| | Mar. | 57 | 2.0 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *b*29.067 |
| | Jan. | 56 | 1.9 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *a* 4.03 | *a* 9.7 | 1.110 | .253 | 28.977 |
| | April | 48 | 2.1 | 16.32 | 43.19 | *a* 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Av. | 43 | 2.0 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Influenza. | May. | 40 | 2.0 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | *a* 4.18 | *a* 4.55 | 9.8 | .955 | .175 | *b*28.982 |
| | Oct. | 29 | 2.8 | *b*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *a* 10.6 | *a*1.256 | .225 | 29.079 |
| | Sept. | 25 | 2.7 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | June | 21 | 2.5 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 84 | *a* 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | Aug. | 16 | 3.1 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *a* 4.56 | *a* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | July | 14 | 2.8 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | SCARLET FEVER. | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Scarlet Fever. | Jan. | 16 | 3.1 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *a* 4.03 | *a* 9.7 | 1.110 | .253 | 28.977 |
| | Feb. | 12 | 3.2 | 18.20 | 20.09 | 88 | 1 42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *b*29.124 |
| | Apr. | 12 | 3.3 | 16.32 | 43.19 | *a* 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | *b*29.000 |
| | Dec. | 12 | 3.6 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *a* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *b*29.093 |
| | Nov. | 11 | 3.3 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *a* 3 03 | *a* 3.28 | 11.3 | 1.135 | *a* .213 | 29.059 |
| | May. | 11 | 3.5 | *b*19.20 | *b*54.30 | *a* 72 | *b* 3.83 | 2.39 | 9.29 | *a* 50 | 4.18 | 4.55 | *a* 9.8 | *a* .955 | *a* .175 | 28.982 |
| | June | 11 | 3.6 | *b*20.52 | *b*69 05 | *a* 74 | *b* 6.12 | 3.83 | 7.85 | *a* 34 | 3.98 | *a* 4.15 | *a* 8.2 | *a* .591 | *a* .138 | *b*29.066 |
| | Av. | 10 | 3.6 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Scarlet Fever. | Oct. | 10 | 3.8 | *b*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *a* 10 6 | *a*1.256 | .225 | 29.079 |
| | Mar. | 10 | 4.0 | *b*16.64 | *b*30.61 | *a* 84 | *b* 2.03 | 1.27 | 10.41 | *a* 56 | *a* 4.30 | *a* 4.92 | *a* 11.7 | *a*1.066 | *a* .290 | 29.067 |
| | July | 7 | 3.8 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3 66 | 8.2 | .487 | .151 | 29.077 |
| | Aug. | 7 | 4.1 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *a* 4.56 | *a* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Sept. | 7 | 4.2 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |

*, †, ‡, §, ‖, ¶, **, For foot-notes with these marks see Exhibit X, page 123.

*a* An exception to Proposition 1, relating to Influenza and Scarlet Fever on page 121.

*b* An exception to Proposition 2, relating to Influenza and Scarlet Fever on page 121.

EXHIBIT XVI.—RHEUMATISM AND NEURALGIA.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Rheumatism and Neuralgia, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| RHEUMATISM. | | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where Present. †. ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute.—Grains of Vapor in a Cubic Foot of Air. | Inhaled. ‖ | Exhaled in excess of that Inhaled. ¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Range. | | Average Pressure. |
| | | | | | | | | | | | | | | Monthly and for Year. | Av. Daily, by 3 Daily Observations.** | |
| More than Av. Per Cent of Rheumatism. | Apr. | 73 | 2.4 | 16.32 | 43.19 | a 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Mar. | 68 | 2.5 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | b 29.067 |
| | May | 67 | 2.2 | b19.20 | b54.30 | a 72 | b 3.83 | 2.39 | 9.29 | a 50 | 4.18 | 4.55 | a 9.8 | a .955 | a .175 | 28.982 |
| | Feb. | 67 | 2.7 | b18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .866 | b 29.124 |
| | Jan. | 66 | 2.7 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | a 4.03 | a 9.7 | 1.110 | .253 | 28.977 |
| | Dec. | 65 | 3.2 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | a 3.81 | 4.58 | 11.7 | 1.313 | .329 | b 29.093 |
| | Oct. | 64 | 2.4 | 17.27 | b50.59 | 79 | b 3.72 | 2.33 | 9.35 | a 47 | a 3.70 | a 3.91 | 10.6 | 1.256 | a .225 | b 29.079 |
| Av. | | 64 | 2.6 | 17.92 | 45.61 | 79 | 3.51 | 2,19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Rheumatism. | Nov. | 64 | 2.7 | b14.28 | b36.61 | a 82 | b 2.37 | 1.48 | 10.20 | a 65 | 3.03 | 3.28 | a 11.3 | a1.135 | .213 | b 29.059 |
| | June. | 61 | 2.1 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | a 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | July | 60 | 2.1 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | b 29.077 |
| | Aug. | 58 | 2.9 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | a 4.56 | a 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Sept. | 57 | 3.0 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.31 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| NEURALGIA. | | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Neuralgia. | Mar. | 65 | 2.4 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | b 29.067 |
| | Feb. | 62 | 2.4 | b18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | b 29.124 |
| | Apr. | 61 | 2.5 | 16.32 | 43.19 | a 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Nov. | 60 | 2.7 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | 3.03 | a 3.28 | 11.3 | 1.135 | a .213 | 29.059 |
| Av. | | 57 | 2.5 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Neuralgia. | Jan. | 57 | 2.5 | b15.05 | b15.23 | a 89 | b 1.19 | .74 | 10.91 | a 76 | a 4.02 | 4.03 | 9.7 | a1.110 | a .258 | b 28.977 |
| | Dec. | 57 | 3.1 | b14.31 | b26.88 | a 88 | b 1.83 | 1.14 | 10.54 | a 80 | 3.81 | a 4.53 | a 11.7 | a1.313 | a .329 | 29.093 |
| | May | 56 | 2.3 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | a 4.18 | a 4.55 | 9.8 | .955 | .175 | b 28.982 |
| | Oct. | 55 | 2.8 | b17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | a 10.6 | a1.256 | .225 | 29.079 |
| | Sept. | 54 | 2.7 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | Aug. | 53 | 2.8 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | a 4.56 | a 4.56 | 7.6 | .489 | .123 | 29.111 |
| | July | 51 | 2.2 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | June | 50 | 2.1 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 31 | a 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |

*, †, ‡, §. ‖. ¶, **. For foot-notes with these marks, see Exhibit X., page 128.

*a* An exception to proposition 1, relating to rheumatism and neuralgia on page 121.

*b* An exception to proposition 2, relating to rheumatism and neuralgia on page 121.

EXHIBIT XVII.—Pulmonary Consumption and Pleuritis.—*Stating for the Year and for each Month of the Year, what Per Cent of the Weekly Reports of Sickness Stated Presence of Pulmonary Consumption and Pleuritis, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| Consumption. | | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Range. | | |
| Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where present. †,‡ | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Monthly and for year. | Av. Daily, by 3 Daily Observations.** | Average Pressure. |
| More than Av. Per Cent of Consumption. | Apr.... | 45 | 3.7 | 16.32 | 43.19 | a 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | May... | 43 | 3.2 | b19.20 | b54.30 | a 72 | b 3.83 | 2.39 | 9.29 | a 50 | 4.18 | 4.55 | a 9.8 | a .955 | a .175 | 28.982 |
| | Mar... | 43 | 3.6 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | b29.067 |
| | Feb... | 38 | 3.5 | b18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | b29.124 |
| Average ...... | | 38 | 3.5 | 17.92 | 45.61 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Average Per Cent of Consumption. | Dec...... | 38 | 4.8 | b14.31 | b26.88 | a 88 | b 1.83 | 1.14 | 10.54 | a 80 | 3.81 | a 4.53 | a 11.7 | a1.313 | a .329 | 29.093 |
| | June.... | 37 | 3.0 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | a 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | Aug. .... | 37 | 3.6 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | a 4.56 | a 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Sept. ... | 37 | 3.6 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.089 |
| | Nov..... | 37 | 3.9 | b14.28 | b36.61 | a 82 | b 2.37 | 1.48 | 10.20 | a 65 | 3.03 | 3.28 | a 11.3 | a1.135 | .213 | b29.059 |
| | July .... | 35 | 3.2 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | Jan. .... | 35 | 3.7 | b15.05 | b15.23 | a 89 | b 1.19 | .74 | 10.94 | a 76 | a 4.02 | 4.03 | 9.7 | a1.110 | a .253 | b28.977 |
| | Oct. .... | 32 | 3.4 | b17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | a 10.6 | a1.256 | .225 | 29.079 |
| Pleuritis. | | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Pleuritis. | Dec...... | 22 | 4.2 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | a 3.81 | 4.53 | 11.7 | 1.313 | .329 | b29.093 |
| | Jan. .... | 21 | 3.9 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | a 4.03 | a 9.7 | 1.110 | .253 | 28.977 |
| | Mar..... | 21 | 3.9 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | b29.067 |
| | Feb. .... | 20 | 3.4 | b18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | b29.124 |
| | Apr. .... | 17 | 4.1 | 16.32 | 43.19 | a 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| Average....... | | 14 | 3.8 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 4.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Pleuritis. | May .... | 13 | 3.4 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | a 4.18 | a 4.55 | 9.8 | .955 | .175 | b28.982 |
| | Nov..... | 12 | 3.8 | b14.28 | b36.61 | a 82 | b 2.37 | 1.48 | 10.20 | a 65 | 3.03 | 3.28 | a 11.3 | a1.135 | .213 | b29.059 |
| | June.... | 11 | 3.7 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | a 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | July .... | 11 | 3.4 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | Oct. .... | 10 | 3.4 | b17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | 10.6 | a1.256 | .225 | 29.079 |
| | Sept. ... | 9 | 4.1 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | Aug. .... | 7 | 4.3 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | a 4.56 | a 4.56 | 7.6 | .489 | .123 | 29.111 |

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*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 123.  
a An exception to Proposition 1, relating to Consumption and Pleuritis, on page 121.  
b An exception to Proposition 2, relating to Consumption and Pleuritis, on page 121.

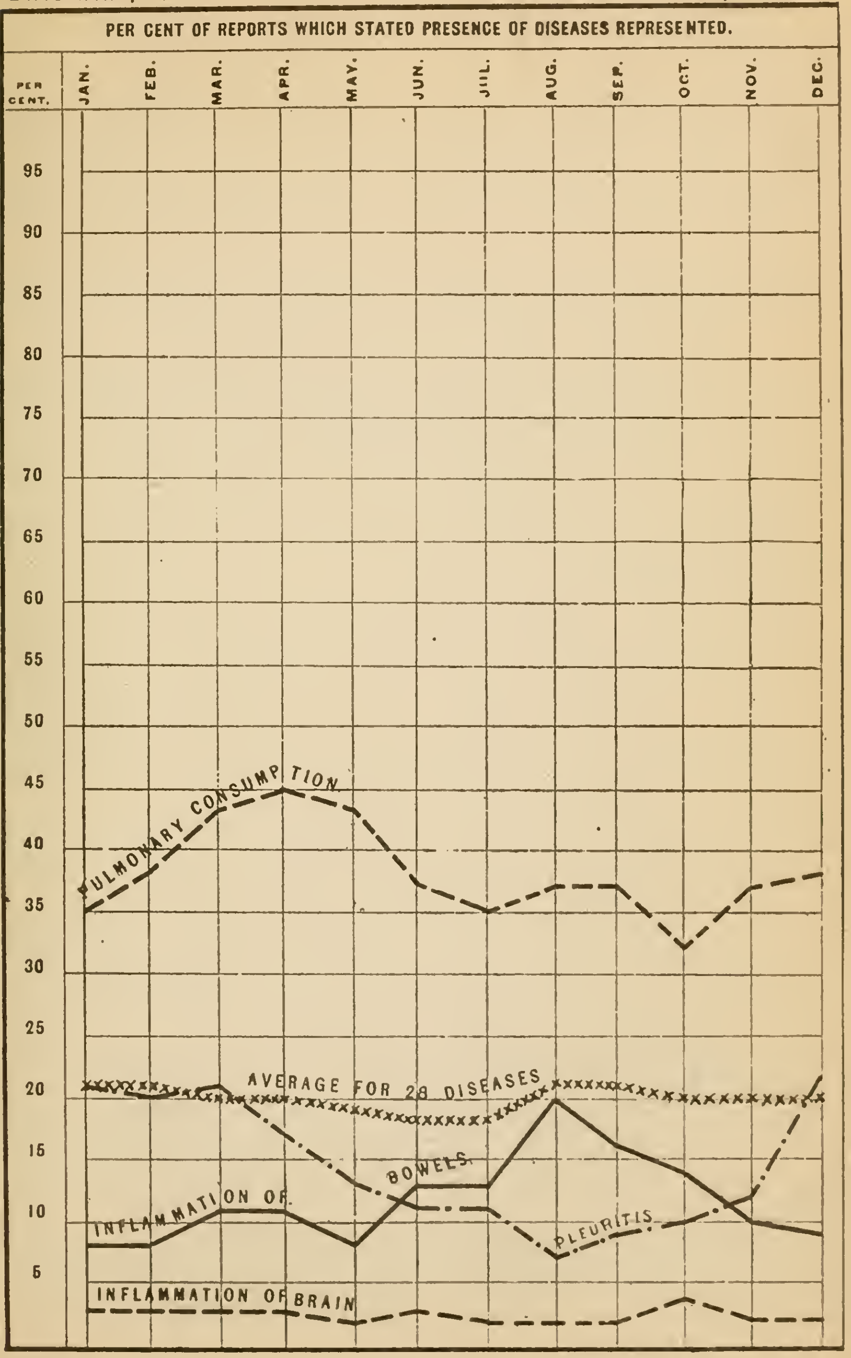
EXHIBIT XVIII.—SICKNESS FROM CONSUMPTION.—1878-93.—*By Year and Months for each of the sixteen years, 1878-93, and an Average for the fifteen years, 1878-92, also for the seven years, 1886-92; Stating on what Per Cent of the Weekly Reports received* CONSUMPTION *was reported Present, and Comparing the Per Cents for 1893 with the Averages for corresponding Months in those years.*

| Years, etc. | Annual Av. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average 15 years, 1878-92* | 58 | 60 | 61 | 62 | 63 | 60 | 58 | 56 | 55 | 55 | 57 | 56 | 57 |
| Average 7 years, 1886-92† | 49 | 52 | 52 | 53 | 54 | 51 | 48 | 47 | 46 | 46 | 46 | 46 | 49 |
| 1877* | 52 | 50 | 47 | 47 | 53 | 49 | 50 | 48 | 35 | 38 | 34 | 68 | 65 |
| 1878 | 71 | 67 | 72 | 76 | 75 | 72 | 68 | 68 | 65 | 70 | 73 | 78 | 71 |
| 1879 | 70 | 71 | 71 | 69 | 77 | 74 | 73 | 69 | 67 | 67 | 69 | 67 | 64 |
| 1880 | 68 | 65 | 69 | 70 | 72 | 70 | 69 | 66 | 62 | 66 | 66 | 68 | 70 |
| 1881 | 71 | 74 | 76 | 73 | 76 | 69 | 68 | 67 | 67 | 70 | 73 | 74 | 67 |
| 1882 | 66 | 66 | 68 | 66 | 66 | 69 | 66 | 67 | 63 | 63 | 65 | 62 | 65 |
| 1883 | 61 | 69 | 66 | 66 | 65 | 62 | 61 | 59 | 55 | 57 | 58 | 58 | 60 |
| 1884 | 63 | 56 | 61 | 66 | 70 | 67 | 65 | 63 | 63 | 63 | 65 | 61 | 58 |
| 1885 | 58 | 60 | 68 | 71 | 69 | 58 | 61 | 56 | 52 | 54 | 55 | 56 | 56 |
| 1886 | 55 | 61 | 58 | 60 | 61 | 60 | 55 | 51 | 52 | 48 | 51 | 55 | 54 |
| 1887 | 51 | 53 | 54 | 61 | 61 | 54 | 48 | 48 | 47 | 45 | 48 | 47 | 50 |
| 1888 | 49 | 50 | 51 | 52 | 47 | 53 | 56 | 51 | 49 | 44 | 43 | 44 | 48 |
| 1889 | 48 | 49 | 49 | 50 | 50 | 46 | 47 | 47 | 46 | 50 | 52 | 49 | 51 |
| 1890 | 52 | 50 | 53 | 55 | 61 | 57 | 52 | 45 | 50 | 51 | 51 | 49 | 55 |
| 1891 | 49 | 58 | 51 | 54 | 59 | 55 | 46 | 45 | 43 | 43 | 44 | 46 | 45 |
| 1892 | 38 | 45 | 45 | 40 | 41 | 33 | 35 | 39 | 37 | 39 | 36 | 34 | 37 |
| 1893 (see Diagram on opposite page) | 38 | 35 | 38 | 43 | 45 | 43 | 37 | 35 | 37 | 37 | 32 | 37 | 38 |
| In 1893 Less than Av. 1886-92 † | 11 | 17 | 14 | 10 | 9 | 8 | 11 | 12 | 9 | 9 | 14 | 9 | 11 |
| In 1893 Less than Av. 1878-92 | 20 | 25 | 23 | 19 | 18 | 17 | 21 | 21 | 18 | 18 | 25 | 19 | 19 |

* As consumption was not printed on the first blanks, nor on all used in 1877, that year is excluded from the average line.

† This comparison is made because of change of plan of reports in May, 1885, as explained on pages 82-83.

DIAGRAM 4—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1893.



[Plate 761.]

## RELATIONS OF DIARRHEA TO METEOROLOGICAL CONDITIONS.

Proposition 1.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **less** than the average for the year. In Exhibit XIX., page 136, the letter *a* marks exceptions to this proposition for the year 1893.

Proposition 2.—That in months when **more** than the average per cent of weekly reports stated the presence of diarrhea, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of diarrhea, these conditions were **greater** than the average for the year. In Exhibit XIX., page 136, the letter *b* marks exceptions to this proposition for 1893.

Explanations of Propositions 1 and 2 are given on page 120, and a summary of the evidence in Exhibit XIX , is given in Exhibit XXVI., on a following page.

Proposition 3.—For those months which are not, as regards the absolute humidity of the atmosphere, exceptions to Proposition 1, it is true also that the quantity of vapor inhaled daily was **greater** than the average, and the quantity exhaled daily in excess of that inhaled was **less** than the average in months when **more** than the average per cent of reports stated presence of diarrhea; and that **less** vapor was inhaled and a **greater** excess exhaled daily in months when the per cent of reports stating presence of diarrhea, was **less** than the average.

Proposition 3 is true also in relation to cholera infantum, intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, whooping-cough, cholera morbus and dysentery, treated in Exhibits XIX., XXI., XXII., XXIII. and XXIV., page 136, and following pages.

On what per cent of the weekly reports received, by months in the sixteen years, 1877–1892, the eight foregoing diseases were reported present, is stated in Exhibit XX., page 137. In Diagram 1, page 89, is graphically represented by months what per cent of the reports in each month in 1893, stated the presence of diarrhea.

The greatest sickness reported from diarrhea in 1893, was in the months of September, August, October and July.

As shown by Exhibit XX., the reports indicate a decreased prevalence of diarrhea in the year 1893. Compared with the year 1892, there was a slightly increased prevalence of diarrhea in June, August, September, October and November, and in every other month there was a marked decrease.

Compared with the corresponding months in the average for the sixteen years, 1877–1892, the per cent of reports of diarrhea was slightly more in January and November, 1893, and for every other month of the year considerably less.

The average temperature for the year 1893, was slightly lower than the average for 1877–1892. It was also lower for each month of the year, except in March, June, July, August, October and November, than the average for corresponding months in the sixteen years, 1877–92. The absolute humidity was slightly more for the year and for each month of the year except January, February, May, August and September, than the average for 1877–1892. The relative humidity was slightly less for the year 1893, and for each month of the year, except in January, March, April, July and October, than the average for the fifteen years, 1878-1892. In July it was the same.

### RELATIONS OF CHOLERA INFANTUM AND OTHER "WARM WEATHER" DISEASES TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when more than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, cholera morbus, dysentery, measles, or whooping-cough), the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere were greater than the average for the year; and in months when less than the average per cent of reports stated the presence of cholera infantum (or of the other diseases named), these conditions were less than the average for the year. In Exhibit XIX., page 136, the letter *a* marks exceptions to this proposition for the year 1893.

Explanations of Propositions 1 and 2 are given on page 120, and a summary of the evidence of Exhibit XIX. is given in Exhibit XXVI., on a following page.

PROPOSITION 2.—That in months when more than the average per cent of weekly reports stated the presence of cholera infantum (or of intermittent fever, remittent fever, typhoid fever, typho-malarial fever, measles, or whooping-cough), the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, and the monthly and average daily range of the barometer were less than the average for the year; and that in months when less than the average per cent of reports stated the presence of cholera infantum (or of the other diseases named), these conditions were greater than the average for the year. In Exhibit XIX., page 136, the letter *b* marks exceptions to this proposition for 1893.

What per cent of all the weekly reports of sickness in each month in 1893, stated the presence of cholera infantum is graphically represented by months in Diagram 1, page 89. What per cent of the reports received by months in the sixteen years, 1877–92, stated presence of cholera infantum and of the other diseases mentioned in Propositions 1 and 2, is stated in Exhibit XX., page 137.

Cholera infantum was most prevalent during the hot months and in October, in 1893, but in each month of 1893, except in October, January and June, there was much less than the average sickness from this disease. January and June were the same and in October, twenty-five per cent more than the average was reported.

EXHIBIT XIX.—DIARRHEA AND CHOLERA INFANTUM.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Diarrhea, also of Cholera Infantum, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| DIARRHEA. | | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Range. | | |
| | Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where Present. †‡ | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Monthly and for Year. | Av. Daily, by 3 Daily Observations.** | Average Pressure. |
| More than Av. Per Cent of Diarrhea. | Sept. | 75 | 1.8 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | Aug. | 74 | 1.7 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *b* 4.56 | *b* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Oct. | 55 | 2.4 | *a*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *b* 10.6 | *b*1.256 | .225 | 29.079 |
| | July | 54 | 2.0 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| Av. | | 40 | 2.6 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Diarrhea. | June | 36 | 2.6 | *a*20.52 | *a*69.05 | *b* 74 | *a* 6.12 | 3.83 | 7 85 | *b* 34 | 3.98 | *b* 4.15 | *b* 8.2 | *b* .591 | *b* .138 | *a*29.066 |
| | Nov. | 29 | 3.1 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *b* 3.03 | *b* 3.28 | 11.3 | 1.135 | *b* .213 | 29.059 |
| | Apr. | 29 | 3.1 | 16.32 | 43.19 | *b* 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | May | 28 | 3.1 | *a*19.20 | *a*54.30 | *b* 72 | *a* 3.83 | 2.39 | 9.29 | *b* 50 | 4.18 | 4.55 | *b* 9.8 | *b* .955 | *b* .175 | 28.982 |
| | Jan. | 28 | 3.3 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *b* 4.03 | *b* 9.7 | 1.110 | .253 | 28.977 |
| | Mar. | 25 | 3.1 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *a*29.067 |
| | Feb. | 25 | 3.3 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *a*29.124 |
| | Dec. | 24 | 3.9 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *b* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *a*29.098 |
| CHOLERA INFANTUM. | | | | | | | | | | | | | | | | |
| More than Av. Pr. Ct. of Cholera Infantum. | Aug. | 34 | 3.0 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *b* 4.56 | *b* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Sept. | 33 | 3.3 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | July | 17 | 3.3 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | Oct. | 15 | 3.0 | *a*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *b* 10.6 | *b*1.256 | .225 | 29.079 |
| Av. | | 10 | 3.4 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .909 | .227 | 29.060 |
| Less than Av. Per cent of Cholera Infantum. | June | 9 | 3.3 | *a*20.52 | *a*69.05 | *b* 74 | *a* 6.12 | 3.83 | 7.85 | *b* 34 | 3.98 | *b* 4.15 | *b* 8.2 | *b* .591 | *b* .138 | *a*29.066 |
| | Jan. | 2 | 5.1 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *b* 4.03 | *b* 9.7 | 1.110 | .253 | 28.977 |
| | Nov. | 2 | 5.3 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *b* 3.03 | *b* 3.28 | 11.3 | 1.135 | *b* .213 | 29.059 |
| | Feb. | 1 | 3.6 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *a*29.124 |
| | May | 1 | 3.6 | *a*19.20 | *a*54.30 | *b* 72 | *a* 3.83 | 2.39 | 9.29 | 50 | 4.18 | 4.55 | *b* 9.8 | *b* .955 | *b* .175 | 28.982 |
| | Mar. | 1 | 5.0 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *a*29.067 |
| | Apr. | 1 | 5.8 | 16.32 | 43.19 | *b* 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Dec. | 1 | 6.7 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *b* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *a*29.093 |

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*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X., page 123.
*a* An exception to proposition 1, relating to diarrhea and cholera infantum, on page 135.
*b* An exception to proposition 2, relating to diarrhea and cholera infantum, on page 135.

EXHIBIT XX.—*By Year and Months for 1893 and for the preceding year, and an Average for the sixteen years, 1877–92, also for the seven years, 1886–1892. Stating on what Per Cent of the Weekly Reports received* DIARRHEA, CHOLERA INFANTUM, INTERMITTENT FEVER, REMITTENT FEVER, TYPHOID FEVER, TYPHO-MALARIAL FEVER, MEASLES, WHOOPING-COUGH, CHOLERA MORBUS ANE DYSENTERY *were Reported Present, and Comparing the Per Cents for 1893, with the Averages for Corresponding Months in those years.**

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diarrhea. | Av. 16 years, 1877–1892 | 46 | 27 | 28 | 30 | 31 | 35 | 43 | 70 | 84 | 78 | 54 | 35 | 28 |
| | Av. 7 years, 1886–1892 | 45 | 28 | 28 | 30 | 30 | 33 | 40 | 66 | 81 | 76 | 51 | 33 | 27 |
| | 1892 | 43 | 30 | 30 | 32 | 32 | 30 | 33 | 55 | 72 | 74 | 52 | 27 | 28 |
| | 1893 | 40 | 28 | 25 | 25 | 29 | 28 | 36 | 54 | 74 | 75 | 55 | 29 | 24 |
| | In 1893 Greater than Av. 1877-1892 | -- | 1 | -- | -- | -- | -- | -- | -- | -- | -- | 1 | -- | -- |
| | In 1893 Less than Av. 1877-92 | 6 | -- | 3 | 5 | 2 | 7 | 7 | 16 | 10 | 3 | -- | 6 | 4 |
| | In 1893 Greater than Av. 1886-1892† | -- | = | -- | -- | -- | -- | -- | -- | -- | -- | 4 | -- | -- |
| | In 1893 Less than Av. 1886-92† | 5 | = | 3 | 5 | 1 | 5 | 4 | 12 | 7 | 1 | -- | 4 | 3 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cholera Infantum. | Av. 16 years, 1877–1892 | 13 | 2 | 2 | 2 | 2 | 3 | 9 | 29 | 45 | 34 | 12 | 4 | 2 |
| | Av. 7 years, 1886–1892 | 12 | 2 | 2 | 1 | 1 | 3 | 8 | 27 | 42 | 32 | 11 | 3 | 2 |
| | 1892 | 11 | 1 | 3 | 2 | 3 | 4 | 5 | 17 | 30 | 28 | 16 | 4 | 3 |
| | 1893 | 10 | 2 | 1 | 1 | 1 | 1 | 9 | 17 | 34 | 33 | 15 | 2 | 1 |
| | In 1893 Greater than Av. 1877-1892 | -- | = | -- | -- | -- | -- | = | -- | -- | -- | 3 | -- | -- |
| | In 1893 Less than Av. 1877-92 | 3 | = | 1 | 1 | 1 | 2 | = | 12 | 11 | 1 | -- | 2 | 1 |
| | In 1893 Greater than Av. 1886-1892† | -- | = | -- | = | = | -- | 1 | -- | -- | 1 | 4 | -- | -- |
| | In 1893 Less than Av. 1886-92† | 2 | = | 1 | = | = | 2 | -- | 10 | 8 | -- | -- | 1 | 1 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Intermittent Fever. | Av. 16 years, 1877–1892 | 60 | 49 | 51 | 53 | 60 | 64 | 66 | 68 | 68 | 68 | 65 | 58 | 51 |
| | Av. 7 years, 1886–1892 | 42 | 36 | 36 | 38 | 44 | 43 | 44 | 47 | 48 | 47 | 45 | 40 | 34 |
| | 1892 | 27 | 22 | 23 | 21 | 29 | 29 | 25 | 29 | 33 | 32 | 28 | 24 | 21 |
| | 1893 | 24 | 19 | 14 | 18 | 25 | 26 | 25 | 27 | 32 | 29 | 28 | 26 | 17 |
| | In 1893 Greater than Av. 1877-1892 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | 36 | 30 | 37 | 35 | 35 | 38 | 41 | 41 | 36 | 39 | 37 | 32 | 34 |
| | In 1893 Greater than Av. 1886-1892† | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1886-92† | 18 | 17 | 22 | 20 | 19 | 17 | 19 | 20 | 16 | 18 | 17 | 14 | 17 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Remittent Fever. | Av. 16 years, 1877–1892 | 41 | 34 | 33 | 35 | 37 | 39 | 40 | 43 | 49 | 51 | 50 | 41 | 36 |
| | Av. 7 years, 1886–1892 | 29 | 26 | 25 | 25 | 27 | 27 | 27 | 29 | 36 | 37 | 36 | 31 | 27 |
| | 1892 | 21 | 11 | 14 | 13 | 19 | 19 | 19 | 23 | 30 | 31 | 26 | 23 | 20 |
| | 1893 | 18 | 13 | 13 | 14 | 14 | 19 | 21 | 20 | 22 | 25 | 24 | 21 | 12 |
| | In 1893 Greater than Av. 1877-1892 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | 23 | 21 | 20 | 21 | 23 | 20 | 19 | 23 | 27 | 26 | 26 | 20 | 24 |
| | In 1893 Greater than Av. 1886-1892† | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1886-92† | 11 | 13 | 12 | 11 | 13 | 8 | 6 | 9 | 14 | 12 | 12 | 10 | 15 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Typhoid Fever. | Av. 16 years, 1877-92 | 11 | 10 | 7 | 6 | 5 | 5 | 5 | 7 | 13 | 20 | 21 | 19 | 14 |
| | Av. 7 years, 1886-1892 | 9 | 7 | 5 | 4 | 3 | 3 | 4 | 6 | 13 | 18 | 9 | 15 | 11 |
| | 1892 | 9 | 7 | 5 | 4 | 4 | 3 | 4 | 5 | 13 | 16 | 17 | 11 | 12 |
| | 1893 | 9 | 6 | 4 | 3 | 3 | 4 | 6 | 7 | 12 | 16 | 23 | 20 | 8 |
| | In 1893 Greater than Av. 1877-1892 | -- | -- | -- | -- | -- | -- | 1 | = | -- | -- | 2 | 1 | -- |
| | In 1893 Less than Av. 1877-92 | 2 | 4 | 3 | 3 | 2 | 1 | -- | = | 1 | 4 | -- | -- | 6 |
| | In 1893 Greater than Av. 1886-1892† | = | -- | -- | -- | = | 1 | 2 | 1 | -- | -- | 14 | 5 | -- |
| | In 1893 Less than Av. 1886-92† | = | 1 | 1 | 1 | = | -- | -- | -- | 1 | 2 | -- | -- | 3 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Typho-malarial Fever. | Av. 16 years, 1877-92 | 18 | 14 | 12 | 11 | 10 | 10 | 10 | 13 | 21 | 33 | 35 | 26 | 17 |
| | Av. 7 years, 1886-1892 | 12 | 8 | 7 | 7 | 7 | 7 | 6 | 8 | 16 | 21 | 22 | 15 | 9 |
| | 1892 | 5 | 2 | 1 | 0.5 | 2 | 2 | 4 | 5 | 7 | 9 | 7 | 8 | 7 |
| | 1893 | 4 | 5 | 2 | 2 | 3 | 2 | 1 | 2 | 7 | 9 | 8 | 8 | 4 |
| | In 1893 Greater than Av. 1877-1892 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | 14 | 9 | 10 | 9 | 7 | 8 | 9 | 11 | 14 | 24 | 27 | 18 | 13 |
| | In 1893 Greater than Av. 1886-1892† | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1886-92† | 8 | 3 | 5 | 5 | 4 | 5 | 5 | 6 | 9 | 12 | 14 | 7 | 5 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measles. | Av. 16 years, 1877-1892 | 12 | 10 | 13 | 16 | 21 | 24 | 20 | 12 | 6 | 4 | 4 | 5 | 7 |
| | Av. 7 years, 1886-1892 | 10 | 8 | 13 | 16 | 18 | 19 | 16 | 9 | 4 | 3 | 3 | 4 | 6 |
| | 1892 | 4 | 2 | 6 | 6 | 8 | 5 | 7 | 4 | 2 | 1 | 2 | 2 | 5 |
| | 1893 | 7 | 10 | 12 | 10 | 11 | 17 | 13 | 8 | 3 | 2 | 1 | 2 | 2 |
| | In 1893 Greater than Av. 1877-1892 | -- | = | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | 5 | = | 1 | 6 | 10 | 7 | 7 | 4 | 3 | 2 | 3 | 3 | 5 |
| | In 1893 Greater than Av. 1886-1892† | -- | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1886-92† | 3 | -- | 1 | 6 | 7 | 2 | 3 | 1 | 1 | 1 | 2 | 2 | 4 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Whooping-cough. | Av. 16 years, 1877-1892 | 17 | 16 | 17 | 17 | 16 | 17 | 17 | 19 | 19 | 18 | 15 | 16 | 15 |
| | Av. 7 years, 1886-1892 | 12 | 10 | 12 | 13 | 13 | 14 | 13 | 15 | 15 | 13 | 10 | 10 | 10 |
| | 1892 | 10 | 8 | 8 | 9 | 12 | 8 | 10 | 14 | 15 | 12 | 7 | 9 | 8 |
| | 1893 | 9 | 7 | 9 | 7 | 7 | 10 | 12 | 11 | 13 | 9 | 7 | 7 | 8 |
| | In 1893 Greater than Av. 1877-1892 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | 8 | 9 | 8 | 10 | 9 | 7 | 5 | 8 | 6 | 9 | 8 | 9 | 7 |
| | In 1893 Greater than Av. 1886-1892† | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | In 1893 Less than Av. 1886-92† | 3 | 3 | 3 | 6 | 6 | 4 | 1 | 4 | 2 | 4 | 3 | 3 | 2 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cholera Morbus. | Av. 16 years, 1877-1892 | 17 | 4 | 4 | 5 | 5 | 8 | 17 | 43 | 55 | 38 | 15 | 6 | 5 |
| | Av. 7 years, 1886-1892 | 16 | 3 | 3 | 3 | 4 | 7 | 14 | 38 | 51 | 36 | 13 | 5 | 4 |
| | 1892 | 15 | 3 | 4 | 3 | 5 | 7 | 15 | 29 | 39 | 37 | 17 | 6 | 4 |
| | 1893 | 14 | 4 | 4 | 5 | 4 | 4 | 13 | 24 | 43 | 38 | 13 | 5 | 3 |
| | In 1893 Greater than Av. 1877-1892 | -- | = | = | = | -- | -- | -- | -- | -- | = | -- | -- | -- |
| | In 1893 Less than Av. 1877-92 | 3 | = | = | = | 1 | 4 | 4 | 19 | 12 | = | 2 | 1 | 2 |
| | In 1893 Greater than Av. 1886-1892† | -- | 1 | 1 | 2 | = | -- | -- | -- | -- | 2 | = | = | -- |
| | In 1893 Less than Av. 1886-92† | 2 | -- | -- | -- | = | 3 | 1 | 14 | 8 | -- | = | = | 1 |

| | Years, etc. | Year. | Jan. | Feb. | March. | April. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dysentery. | Av. 16 years, 1877-1892 | 18 | 7 | 7 | 7 | 8 | 9 | 13 | 28 | 51 | 46 | 23 | 11 | 7 |
| | Av. 7 years, 1886-1892 | 17 | 6 | 7 | 7 | 7 | 8 | 10 | 23 | 45 | 42 | 21 | 10 | 7 |
| | 1892 | 15 | 8 | 7 | 8 | 8 | 6 | 11 | 12 | 28 | 38 | 23 | 10 | 6 |
| | 1893 | 13 | 7 | 5 | 7 | 4 | 4 | 9 | 13 | 34 | 41 | 25 | 9 | 2 |
| | In 1893 Greater than Av. 1877-1892 | -- | = | -- | = | -- | -- | -- | -- | -- | -- | 2 | -- | -- |
| | In 1893 Less than Av. 1877-92 | 5 | = | 2 | = | 4 | 5 | 4 | 15 | 17 | 5 | -- | 2 | 5 |
| | In 1893 Greater than Av. 1886-1892† | -- | 1 | -- | = | -- | -- | -- | -- | -- | -- | 4 | -- | -- |
| | In 1893 Less than Av. 1886-92† | 4 | -- | 2 | = | 3 | 4 | 1 | 10 | 11 | 1 | -- | 1 | 5 |

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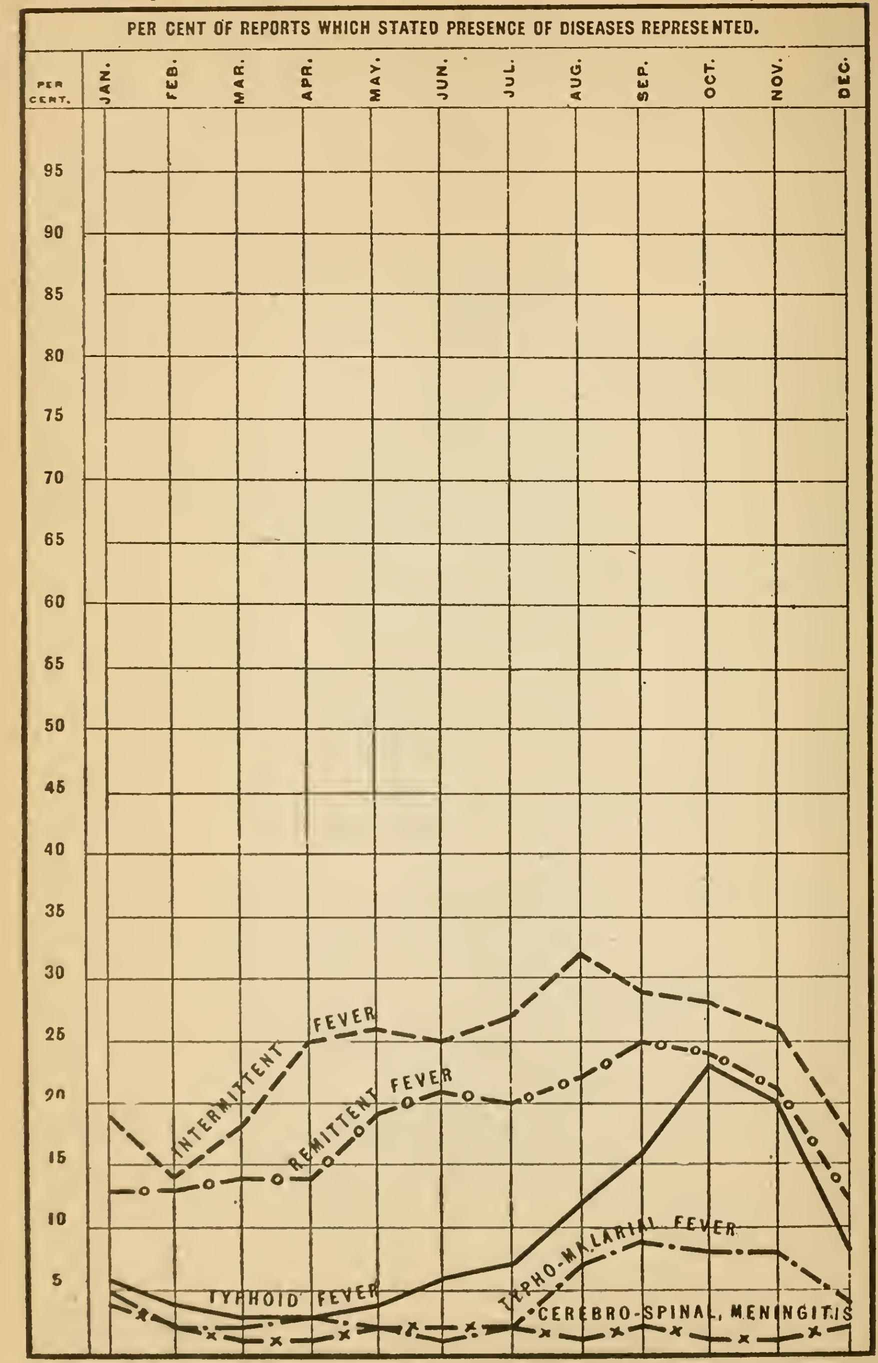
* Other statements for 1893, and months in 1893, relative to these diseases are given in Table 2, pages 100-109, and in Exhibits XIX., XXI., XXII., XXIII. and XXIV., pages 136, 139, 140, 141, and 142, where are also given for convenient comparison statements of coincident meteorological conditions. The lines for 1893 are graphically represented in Diagrams 1, page 89, 3, page 127, and 5, page 138.

† This comparison is made because of change of plan of reports in May, 1885, as explained on pages 82–83.

DIAGRAM 5—WEEKLY REPORTS OF SICKNESS IN MICHIGAN, IN 1893.



[Plate 762.]

EXHIBIT XXI.—INTERMITTENT FEVER AND REMITTENT FEVER.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Intermittent Fever and Remittent Fever, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| INTERMITTENT FEVER. | | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Months in order of Greatest Per Cent of Weekly Reports Stating Presence of. | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where present.†‡ | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Range. | | Average Pressure. |
| | | | | | | | | | | | | | | Monthly and for year. | Av. Daily by 3 Daily Observations.** | |
| More than Av. Per Cent of Intermittent Fever. | Aug. | 32 | 2.8 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *b* 4.56 | *b* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Sept. | 29 | 3.1 | 20.36 | 60.40 | 75 | 4 78 | 2.99 | 8.69 | 43 | 3.34 | 3 24 | 9.2 | .616 | .167 | 29.086 |
| | Oct. | 28 | 2.5 | *a*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3 70 | 3.91 | *b* 10.6 | *b*1.256 | .225 | 29.079 |
| | July | 27 | 2.4 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | May | 26 | 2.8 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9 29 | 50 | *b* 4.18 | *b* 4.55 | 9.8 | .955 | .175 | *a* 28.982 |
| | Nov. | 26 | 3.0 | *a*14.28 | *a*36.61 | *b* 82 | *a* 2.37 | 1.48 | 10.20 | *b* 65 | 3.03 | 3.28 | *b* 11.3 | *b*1.135 | .213 | 29.059 |
| | June | 25 | 2.7 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | *b* 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | April | 25 | 3.0 | *a*16.32 | *a*43.19 | 73 | *a* 2.77 | 1.73 | 9.95 | *b* 68 | *b* 3.92 | *b* 4.62 | *b* 13.2 | *b*1.138 | *b* .288 | *a* 29.000 |
| | Av. | 24 | 2.9 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Intermittent Fever. | Jan. | 19 | 3.4 | 15.05 | 15.28 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *b* 4.03 | *b* 9.7 | 1.110 | .253 | 28.977 |
| | Mar. | 18 | 3.4 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *a* 29.067 |
| | Dec. | 17 | 4.0 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *b* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *a* 29.093 |
| | Feb. | 14 | 3.0 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *a* 29.124 |
| REMITTENT FEVER. | | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Remittent Fever. | Sept. | 25 | 3.0 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3 24 | 9.2 | .616 | .167 | 29.086 |
| | Oct. | 24 | 2.7 | *a*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *b* 10.6 | *b*1.256 | .225 | 29.079 |
| | Aug. | 22 | 3.0 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *b* 4.56 | *b* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | June | 21 | 2.6 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | *b* 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | Nov. | 21 | 2.9 | *a*14.28 | *a*36.61 | *b* 82 | *a* 2.37 | 1.48 | 10.20 | *b* 65 | 3.03 | 3.28 | *b* 11.3 | *b*1.135 | .213 | *a* 29.059 |
| | July | 20 | 2.6 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| | May | 19 | 3.1 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | *b* 4.18 | *b* 4.55 | 9.8 | .955 | .175 | *a* 28.982 |
| | Av. | 18 | 2.9 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Remittent Fever. | April | 14 | 3.3 | 16.32 | 43.19 | *b* 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Mar. | 14 | 2.9 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *a* 29.067 |
| | Feb. | 13 | 2.8 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | 29.124 |
| | Jan. | 13 | 3.1 | 15.05 | 15.28 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *b* 4.03 | *b* 9.7 | 1.110 | .253 | *a* 28 977 |
| | Dec. | 12 | 3.8 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *b* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *a* 29.093 |

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*, †, ‡, § ‖, ¶, **. For foot-notes with these marks, see Exhibit X., page 123.

*a* An exception to proposition 1, relating to intermittent fever and remittent fever, on page 135.

*b* An exception to proposition 2, relating to intermittent fever and remittent fever, on page 135.

EXHIBIT XXII.—TYPHOID FEVER AND TYPHO-MALARIAL FEVER.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Typhoid Fever and Typho-Malarial Fever, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| Typhoid Fever. | | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | | Ozone, Relative Scale of 10°. | | | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Range. | | |
| | Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where Present. †, ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled. ‖ | Exhaled in excess of that Inhaled. ¶ | Average Per Cent of Cloudiness. | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | Av. Velocity of Wind, Miles per Hour by Anemometer. | Monthly and for Year. | Av. Daily, by 3 Daily Observations.** | Average Pressure. |
| More than Av. Per Cent of Typhoid Fever. | Oct. | 23 | 2.6 | *a*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *b* 10.6 | *b*1.256 | .225 | 29.079 |
| | Nov. | 20 | 2.7 | *a*14.28 | *a*36.61 | *b* 82 | *a* 2.37 | 1.48 | 10.20 | *b* 65 | 3.03 | 3.28 | *b* 11.3 | *b*1.135 | .213 | *a*29.059 |
| | Sept. | 16 | 3.5 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | Aug. | 12 | 3.4 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *b* 4.56 | *b* 4.56 | 7.6 | .489 | .123 | 29.111 |
| Average | | 9 | 3.2 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Average Per Cent of Typhoid Fever. | Dec. | 8 | 4.5 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *b* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *a*29.093 |
| | July | 7 | 3.6 | *a*20.75 | *a*72.16 | *b* 72 | *a* 6.50 | 4.06 | 7.62 | *b* 38 | *b* 3.50 | *b* 3.66 | *b* 8.2 | *b* .487 | *b* .151 | *a*29.077 |
| | June | 6 | 2.6 | *a*20.52 | *a*69.05 | *b* 74 | *a* 6.12 | 3 83 | 7.85 | *b* 34 | 3.98 | *b* 4.15 | *b* 8.2 | *b* .591 | *b* .138 | *a*29.066 |
| | Jan. | 6 | 3.2 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *b* 4.03 | *b* 9.7 | 1.110 | .253 | 28.977 |
| | May | 4 | 2.4 | *a*19.20 | *a*54.30 | *b* 72 | *a* 3.83 | 2.39 | 9.29 | *b* 50 | 4.18 | 4.55 | *b* 9.8 | *b* .955 | *b* .175 | 28.982 |
| | Feb. | 4 | 3.8 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *a*29.124 |
| | Apr. | 3 | 1.8 | 16.32 | 43.19 | *b* 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Mar. | 3 | 4.1 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *a*29.067 |
| TYPHO-MAL. FEVER. | | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Typho mal. Fever. | Sept. | 9 | 3.3 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | Oct. | 8 | 3.1 | *a*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *b* 10.6 | *b*1.256 | .225 | 29.079 |
| | Nov. | 8 | 4.0 | *a*14.28 | *a*36.61 | *b* 82 | *a* 2.37 | 1.48 | 10.20 | *b* 65 | 3.03 | 3.28 | *b* 11.3 | *b*1.135 | .213 | *a*29.059 |
| | Aug. | 7 | 3.4 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *b* 4.56 | *b* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Jan. | 5 | 3.9 | *a*15.05 | *a*15.23 | *b* 89 | *a*1.19 | .74 | 10.94 | *b* 76 | *b* 4.02 | 4.03 | 9.7 | *b*1.110 | *b* .253 | *a*28.977 |
| Average | | 4 | 3.6 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Typho-mal. Fever. | Dec. | 4 | 5.2 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *b* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *a*29.093 |
| | Apr. | 3 | 3.7 | 16.32 | 43.19 | *b* 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Mar. | 2 | 2.6 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *a*29.067 |
| | July | 2 | 2.9 | *a*20.75 | *a*72.16 | *b* 72 | *a* 6.50 | 4.06 | 7.62 | *b* 38 | *b* 3.50 | *b* 3.66 | *b* 8.2 | *b* .487 | *b* .151 | *a*29.077 |
| | May | 2 | 3.3 | *a*19.20 | *a*54.30 | *b* 72 | *a* 3.83 | 2.39 | 9.29 | *b* 50 | 4.18 | 4.55 | *b* 9.8 | *b* .955 | *b* .175 | 28.982 |
| | Feb. | 2 | 3.8 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *a*29.124 |
| | June | 1 | 4.5 | *a*20.52 | *a*69.05 | *b* 74 | *a* 6.12 | 3.83 | 7.85 | *b* 34 | 3.98 | *b* 4.15 | *b* 8.2 | *b* .591 | *b* .138 | *a*29.066 |

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 123.

*a* An exception to Proposition 1, relating to Typhoid Fever and Typho-malarial Fever, on page 135.

*b* An exception to Proposition 2, relating to Typhoid Fever and Typho-malarial Fever, on page 135.

**EXHIBIT XXIII.**—MEASLES AND WHOOPING-COUGH.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Measles and Whooping-Cough, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| MEASLES. | | | | Temperature, F. | | Humidity of Air § Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | Per Cent of Weekly Reports stating Presence of. | Av. Order of Prevalence where Present. †. ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Range. Monthly and for Year. | Range. Av. Daily, by 3 Daily Observations.** | Average Pressure. |
| More than Av. Per Cent of Measles. | May | 17 | 2.6 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | b 4.18 | b 4 55 | 9.8 | .955 | .175 | a 28.982 |
| | June | 13 | 2.2 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | b 3.98 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | Feb. | 12 | 2.4 | 18.20 | a20.09 | b 88 | a 1.42 | .89 | 10.79 | b 65 | b 4.54 | b 4.92 | b 11.7 | b1.482 | b .366 | 29.124 |
| | Apr. | 11 | 2.4 | a16.32 | a43.19 | 73 | a 2.77 | 1.73 | 9.95 | b 68 | b 3.92 | b 4.62 | b 13.2 | b1.138 | b .288 | a 29.000 |
| | Mar. | 10 | 2.4 | a16.64 | a30.61 | b 84 | a 2.03 | 1.27 | 10.41 | b 56 | b 4.30 | b 4.92 | b 11.7 | b1.066 | b .290 | 29.067 |
| | Jan. | 10 | 3.3 | a15.05 | a15.23 | b 89 | a 1.19 | .74 | 10.94 | b 76 | b 4.02 | 4.03 | 9.7 | b1.110 | b .253 | a 28.977 |
| | July | 8 | 2.9 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| Av. | | 7 | 2.8 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Measles. | Aug. | 3 | 5.6 | a22.12 | a68.57 | b 70 | 5.58 | 3.49 | 8.19 | b 30 | 4.56 | 4.56 | b 7.6 | b .489 | b .123 | a 29.111 |
| | Sept. | 2 | 3.3 | a20.36 | a60.40 | b 75 | a 4.78 | 2.99 | 8.69 | b 43 | b 3.34 | b 3.24 | b 9.2 | b .616 | b .167 | a 29.086 |
| | Nov. | 2 | 3.5 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | b 3.03 | b 3.28 | 11.3 | 1.135 | b .213 | 29.059 |
| | Dec. | 2 | 5.3 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | b 3.81 | 4.53 | 11.7 | 1.313 | .329 | a 29.093 |
| | Oct. | 1 | 4.0 | 17.27 | a50.59 | 79 | a 3.72 | 2.33 | 9.35 | b 47 | b 3.70 | b 3.91 | 10.6 | 1.256 | b .225 | a 29.079 |
| | WHOOPING-COUGH. | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Whooping-Cough. | Aug. | 18 | 8.1 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | b 4.56 | 4.56 | 7.6 | .489 | .123 | 29.111 |
| | June. | 12 | 2.3 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | b 3.98 | b 4.15 | 8.2 | .591 | .138 | 29.066 |
| | July | 11 | 2.0 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | b 3.66 | 8.2 | .487 | .151 | 29.077 |
| | May | 10 | 2.4 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | b 4.18 | 4.55 | 9.8 | .955 | .175 | a 28.982 |
| Av. | | 9 | 3.0 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Whooping-Cough. | Feb. | 9 | 3.1 | a18.20 | 20.09 | 88 | 1.42 | .89 | 10 79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | a 29.124 |
| | Sept. | 9 | 4.3 | a20.36 | a60.40 | b 75 | a 4.78 | 2.99 | 8.69 | b 43 | b 3.34 | b 3.24 | b 9.2 | b .616 | b .167 | a 29.086 |
| | Dec. | 8 | 3.6 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | b 3.81 | 4.53 | 11.7 | 1.313 | .329 | a 29.093 |
| | Mar. | 7 | 2.8 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | a 29.067 |
| | Apr. | 7 | 3.0 | 16.32 | 43.19 | b 73 | 2.77 | 1.73 | 9 95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Jan. | 7 | 3.1 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | b 4.03 | b 9.7 | 1.110 | .253 | 28.977 |
| | Oct. | 7 | 3.6 | 17.27 | a50.59 | 79 | a 3.72 | 2.33 | 9.35 | b 47 | b 3.70 | b 3.91 | 10.6 | 1.256 | b .225 | a 29.079 |
| | Nov. | 7 | 3.9 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | b 3.03 | b 3.28 | 11.3 | 1.135 | b .213 | 29 059 |

*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 123.
*a* An exception to Proposition 1, relating to measles and whooping-cough on page 135.
*b* An exception to Proposition 2, relating to measles and whooping-cough on page 135.

## EXHIBIT XXIV.—Cholera Morbus and Dysentery.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Cholera Morbus and Dysentery, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| Cholera Morbus. | | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the Air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, Inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where Present. †, ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of Saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Range. | | Average Pressure. |
| | | | | | | | | | | | | | | Monthly and for Year. | Av. Daily, by 8 Daily Observations.** | |
| More than Av. Per Cent of Cholera Morbus. | Aug. | 43 | 2.8 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *b* 4.56 | *b* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Sept. | 38 | 3.1 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | July | 24 | 3.1 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| Average | | 14 | 3.3 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Cholera Morbus. | June | 13 | 3.2 | *a*20.52 | *a*69.05 | *b* 74 | *a* 6.12 | 3.83 | 7.85 | *b* 34 | 3.98 | *b* 4.15 | *b* 8.2 | *b* .591 | *b* .138 | *a* 29.066 |
| | Oct. | 13 | 3.7 | 17.27 | *a*50.59 | 79 | *a* 3.72 | 2.33 | 9.35 | *b* 47 | *b* 3.70 | *b* 3.91 | 10.6 | 1.256 | *b* .225 | *a* 29.079 |
| | Mar. | 5 | 3.8 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *a* 29.067 |
| | Nov. | 5 | 3.9 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *b* 3.03 | *b* 3.28 | 11.3 | 1.135 | *b* .213 | 29.059 |
| | Apr. | 4 | 2.9 | 16.32 | 43.19 | *b* 73 | 2.77 | 1.73 | 4.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Feb. | 4 | 3.3 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *a* 29.124 |
| | Jan. | 4 | 3.8 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4 02 | *b* 4.03 | *b* 9.7 | 1.110 | .253 | 28 977 |
| | May | 4 | 4.5 | *a*19.20 | *a*54.30 | *b* 72 | *a* 3.83 | 2.89 | 9.29 | *b* 50 | 4.18 | 4.55 | *b* 9.8 | *b* .955 | *b* .175 | 28.982 |
| | Dec. | 3 | 5.8 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *b* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *a* 29.093 |
| Dysentery. | | | | | | | | | | | | | | | | |
| More than Av. Per Cent of Dysentery. | Sept. | 41 | 3.3 | 20.36 | 60.40 | 75 | 4.78 | 2.99 | 8.69 | 43 | 3.34 | 3.24 | 9.2 | .616 | .167 | 29.086 |
| | Aug. | 34 | 3.2 | 22.12 | 68.57 | 70 | 5.58 | 3.49 | 8.19 | 30 | *b* 4.56 | *b* 4.56 | 7.6 | .489 | .123 | 29.111 |
| | Oct. | 25 | 3.3 | *a*17.27 | 50.59 | 79 | 3.72 | 2.33 | 9.35 | 47 | 3.70 | 3.91 | *b* 10.6 | *b*1.256 | .225 | 29.079 |
| | July | 13 | 3.6 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |
| Average | | 13 | 3.6 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Cent of Dysentery. | June | 9 | 3.4 | *a*20.52 | *a*69.05 | *b* 74 | *a* 6.12 | 3.83 | 7.85 | *b* 34 | 3.98 | *b* 4.15 | *b* 8.2 | *b* .591 | *b* .138 | *a* 29.066 |
| | Nov. | 9 | 4.0 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *b* 3.03 | *b* 3.28 | 11.3 | 1.135 | *b* .218 | 29.059 |
| | Mar. | 7 | 3.8 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *a* 29.067 |
| | Jan. | 7 | 4.3 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *b* 4.03 | *b* 9.7 | 1.110 | .253 | 28,977 |
| | Feb | 5 | 4 2 | *a*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *a* 29.124 |
| | May | 4 | 3.4 | *a*19.20 | *a*54.30 | *b* 72 | *a* 3.83 | 2.39 | 9.29 | *b* 50 | 4.18 | 4.55 | *b* 9.8 | *b* .955 | *b* .175 | 28.982 |
| | Apr. | 4 | 5.2 | 16.32 | 43.19 | *b* 73 | 2.77 | 1.73 | 9.95 | 68 | 3.92 | 4.02 | 13.2 | 1.138 | .288 | 29.000 |
| | Dec. | 2 | 5.3 | 14.31 | 26.88 | 88 | 1.83 | 1.14 | 10.54 | 80 | *b* 3.81 | 4.53 | 11.7 | 1.313 | .329 | *a* 29.093 |

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*, †, ‡, §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 123.

*a* An exception to Proposition 1, relating to Cholera Morbus and Dysentery, on page 135.

*b* An exception to Proposition 2, relating to Cholera Morbus and Dysentery, on page 135.

## COLD-WEATHER DISEASES.

EXHIBIT XXV.—*Summary Relative to Propositions contained in Exhibits X., XII:, XIV., XV., XVI., etc., (pages 123–142) concerning Relations by Months in 1893, between Greater or Less than usual Prevalence of Diseases Named, and Certain given Coincident Climatic Conditions.*

| Diseases. | Months (inclusive) in which Diseases named were more than Usually Prevalent in 1893. | Months (inclusive) in which Diseases named were less than Usually Prevalent in 1893. | For the 12 months of the year 1893. Number of months in which Propositions hold true.* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | That in Months when Diseases named were more than usually prevalent the conditions named below were Greater than usual, and in Months when Less than usually prevalent these conditions were Less than usual. | | | | | | | That in Mos. when Diseases named were more than usually prevalent the conditions named below were Lower than usual, and in mos. when the Diseases were Less than usually prevalent these conditions were higher than usual. | | | |
| | | | Relative Humidity. | Av. Per Cent of Cloudiness. | Ozone. | | Velocity of Wind. | Atmospheric Pressure. Range. | | Average Temp. | Av. Daily Range of Temperature. | Av. Daily Atmospheric Pressure. | Absolute Humidity. |
| | | | | | Day. | Night. | | Monthly. | Av. Daily. | | | | |
| Bronchitis | Jan.-May, Nov. Dec. | June-Oct. | 10 | 11 | 8 | 10 | 9 | 10 | 10 | 11 | 9 | 9 | 11 |
| Pneumonia | Jan.-Apr., Nov., Dec. | May-Oct. | 11 | 12 | 7 | 8 | 10 | 11 | 11 | 12 | 10 | 8 | 12 |
| Membran. Croup | Feb.-Apr., Nov. | Jan., May-Oct., Dec. | 9 | 10 | 7 | 8 | 10 | 9 | 10 | 10 | 8 | 8 | 10 |
| Diphtheria | Jan., Feb., May-Aug., Nov. | Mar., Apr., Sept., Oct., Dec. | 6 | 5 | 8 | 5 | 3 | 4 | 4 | 5 | 3 | 7 | 5 |
| Tonsillitis | Jan.-May, Nov., Dec. | June-Oct. | 10 | 11 | 8 | 9 | 9 | 10 | 10 | 11 | 9 | 9 | 11 |
| Influenza | Jan.-Apr., Nov., Dec. | May-Oct. | 11 | 12 | 7 | 8 | 10 | 11 | 11 | 12 | 10 | 8 | 12 |
| Scarlet Fever | Jan., Feb., Apr.-June, Nov., Dec. | Mar., July-Oct. | 8 | 9 | 8 | 7 | 7 | 8 | 8 | 9 | 8 | 8 | 9 |
| Rheumatism | Jan.-May, Oct., Dec. | June-Sept., Nov. | 9 | 9 | 8 | 9 | 9 | 10 | 10 | 9 | 9 | 6 | 9 |
| Neuralgia | Feb.-Apr., Nov. | Jan., May-Oct., Dec. | 9 | 10 | 7 | 8 | 10 | 9 | 9 | 10 | 8 | 8 | 10 |
| Consumption | Feb.-May. | June-Dec. | 7 | 8 | 9 | 10 | 8 | 7 | 9 | 8 | 6 | 8 | 8 |
| Pleuritis | Jan.-Apr., Dec. | May-Nov. | 10 | 11 | 8 | 9 | 10 | 10 | 12 | 11 | 9 | 7 | 11 |
| Av. Disease | Jan.-Apr., Aug., Nov. | May-July, Dec. | 8 | 8 | 7 | 6 | 8 | 9 | 7 | 8 | 8 | 6 | 6 |

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* The figures in each of these 11 columns show for how many months out of the twelve months in 1893. the proposition named over the column holds true, thus, concerning bronchitis, the proposition relative to average daily range of temperature held true in nine months out of the twelve; that relative to average temperature, in eleven out of twelve, etc.

## WARM-WEATHER DISEASES.

EXHIBIT XXVI.—*Summary Relative to Propositions Contained in Exhibits XIX., XXI., etc., (pages 136, 142, etc.), concerning Relations, by Months in 1893, between Greater or Less than Usual Prevalence of Diseases named, and certain given Coincident Climatic Conditions.*

| Diseases. | Months (inclusive) in which Diseases named were more than usually Prevalent in 1893. | Months (inclusive) in which Diseases named were less than usually Prevalent in 1893. | For the 12 Months of the Year 1893. Number of Months in which Propositions hold true.* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | That in Months when Diseases named were More Prevalent than Usual the Conditions named below were Higher than Usual, and in Months when the Diseases were less Prevalent than Usual these Conditions were lower than Usual. | | | | That in Months when Diseases named were More Prevalent than Usual the Conditions named below were less than Usual, and in Months when the Diseases were less Prevalent than Usual these Conditions were Greater than Usual. | | | | | | |
| | | | | | | | Atmospheric Pressure. | | | | Ozone. | | |
| | | | | | | | Range. | | | | | | |
| | | | Average Temperature. | Av. Daily Range of Temp. | Absolute Humidity. | Av. Daily Atmospheric Pressure. | Monthly. | Av. Daily. | Relative Humidity. | Av. per Cent of Cloudiness. | Day. | Night. | Velocity of Wind. |
| Diarrhea | July-Oct. | Jan.-June, Nov., Dec. | 10 | 8 | 10 | 8 | 9 | 9 | 9 | 10 | 9 | 8 | 8 |
| Cholera Infantum | July-Oct. | Jan.-June, Nov., Dec. | 10 | 8 | 10 | 8 | 9 | 9 | 9 | 11 | 9 | 8 | 8 |
| Intermittent Fever | April-Nov. | Jan.-Mar., Dec. | 10 | 8 | 10 | 6 | 9 | 11 | 11 | 10 | 7 | 8 | 8 |
| Remittent Fever | May-Nov. | Jan.-Apr., Dec. | 11 | 9 | 11 | 7 | 10 | 12 | 10 | 11 | 8 | 9 | 9 |
| Typhoid Fever | Aug.-Nov. | Jan.-July, Dec. | 8 | 6 | 8 | 6 | 7 | 9 | 7 | 8 | 9 | 8 | 6 |
| Typho-mal. Fever | Jan., Aug.-Nov. | Feb.-July, Dec. | 7 | 5 | 7 | 5 | 6 | 8 | 6 | 7 | 8 | 9 | 7 |
| Measles | Jan.-July | Aug.-Dec. | 5 | 7 | 5 | 5 | 6 | 4 | 7 | 5 | 2 | 5 | 7 |
| Whooping-cough | May-Aug. | Jan.-Apr., Sept.-Dec. | 10 | 10 | 10 | 6 | 11 | 9 | 10 | 10 | 5 | 6 | 10 |
| Cholera morbus | July-Sept. | Jan.-June, Oct.-Dec. | 9 | 9 | 9 | 7 | 10 | 8 | 9 | 9 | 8 | 7 | 9 |
| Dysentery | July-Oct. | Jan.-June, Nov., Dec. | 10 | 8 | 10 | 8 | 9 | 9 | 9 | 10 | 9 | 8 | 8 |

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* The figures in each of these 11 columns show for how many months out of the twelve months in 1893 the proposition named over the column holds true; thus, concerning diarrhea, the proposition relative to average daily range of temperature held true in eight months out of the twelve; that relative to absolute humidity ten months out of the twelve, etc.

### TOTAL SICKNESS—AVERAGE DISEASE.

"Average disease" is an average of the tabulated diseases reported present on all the cards received and compiled at this office during the year. It is probably equivalent to the actual sickness from all diseases printed on the report cards, and probably represents very nearly the average sickness from all the diseases in the State. A sample of the report cards on which diseases are reported to this office is found on page 83. Twenty-eight diseases are printed on the cards. In 1893 there were 5,853 of these card reports received. On some of the cards only one or two diseases were reported present; on others twenty or more were reported present. Had each disease (printed on this card, and only the twenty-eight thus named) been reported present on every card received at this office, there would have been 163,884 reports of diseases present. (This is the product of 5,853 reports received multiplied by 28, the number of diseases printed on the cards, or 100 per cent of the possible disease reports.) There were actually present on the cards received at this office only 32,723 disease reports which 32,723÷163,884 of the possible disease reports that might have been present, is 20 per cent. This 20 per cent represents the actual sickness in the State from the tabulated diseases reported present, or in other words the sickness from "average disease." (See Diagram 4, page 133 )

Exhibit XXVII. serves to indicate the probable actual sickness in the State from the tabulated diseases in each year from 1877 to 1893. It compares the sickness in 1893 by months with the sickness by months in each of the sixteen years, 1877 to 1892. It also compares the sickenss in 1893, by months with the sickness, by months, in each of the seven years, 1886–1892. This last comparison is made because of the change in the plan of reports, which occurred in May, 1885, since which time the plan has been to have reported only the sickness actually observed by the physician who reports. Previous to May, 1885, some reported sickness that, by conference with other physicians, they believed to have occurred. Since May, 1885, the subject is placed upon a scientific basis.

By Exhibit XXVII., it will be seen that the sickness reported in 1893, was, for the year, and for each month of the year, considerably less than the average reported for the sixteen years, 1877–92. That exhibit also shows that the sickness reported in Michigan for the year 1893, and for each month was less than the average for the seven years, 1886–1892.

On this subject Exhibits A. and B., on pages 112 and 113, and the accompanying remarks, may be studied in connection with the exhibits and remarks in this part of this article. In Exhibit A., the order of prevalence of each disease, including the "Average Disease," is shown as it appears after taking account of the order of prevalence of each disease in the places where it was present, and also the per cent of all reports received on which that disease was reported.

EXHIBIT XXVII.—SICKNESS FROM AVERAGE DISEASE, 1877-93.—*By Year and Months for each of the seventeen Years, 1877-93, Stating on an Average for such of the 28 diseases tabulated as were reported present, what Per Cent of the Weekly Reports received stated presence of the Diseases, and comparing the Average Per Cents for Months in 1893, with the Averages for corresponding Months in the Years 1877-92; also comparing the Averages for the Months in 1893 with the Averages for corresponding Months in the seven years 1886-1892.**

| Years, Etc. | Annual Av. | January. | February. | March. | April. | May. | June. | July. | August. | September. | October. | November. | December. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average 16 years, 1877-92 | 28 | 28 | 29 | 29 | 28 | 27 | 25 | 27 | 30 | 30 | 28 | 27 | 27 |
| Average 7 years, 1886-92 | 24 | 25 | 26 | 26 | 26 | 24 | 22 | 24 | 26 | 26 | 24 | 23 | 24 |
| 1877 | 28 | 27 | 28 | 26 | 24 | 24 | 23 | 26 | 29 | 31 | 30 | 30 | 30 |
| 1878 | 30 | 30 | 30 | 31 | 29 | 28 | 26 | 28 | 32 | 35 | 34 | 30 | 32 |
| 1879 | 33 | 35 | 36 | 36 | 35 | 30 | 30 | 32 | 37 | 36 | 34 | 34 | 33 |
| 1880 | 32 | 32 | 32 | 32 | 31 | 30 | 31 | 34 | 36 | 35 | 32 | 30 | 31 |
| 1881 | 33 | 34 | 34 | 32 | 35 | 31 | 30 | 34 | 37 | 36 | 35 | 32 | 31 |
| 1882 | 30 | 31 | 30 | 30 | 30 | 29 | 28 | 28 | 30 | 34 | 32 | 31 | 29 |
| 1883 | 30 | 30 | 31 | 33 | 33 | 31 | 29 | 29 | 32 | 32 | 29 | 29 | 28 |
| 1884 | 29 | 28 | 29 | 30 | 28 | 28 | 29 | 31 | 34 | 34 | 33 | 30 | 29 |
| 1885 | 26 | 29 | 29 | 30 | 28 | 25 | 24 | 26 | 27 | 27 | 26 | 26 | 26 |
| 1886 | 26 | 26 | 26 | 28 | 27 | 26 | 23 | 26 | 27 | 28 | 25 | 25 | 25 |
| 1887 | 25 | 26 | 27 | 28 | 26 | 25 | 24 | 27 | 29 | 26 | 25 | 24 | 24 |
| 1888 | 24 | 24 | 26 | 27 | 26 | 24 | 23 | 22 | 25 | 25 | 28 | 22 | 23 |
| 1889 | 23 | 23 | 22 | 24 | 23 | 23 | 21 | 24 | 27 | 28 | 26 | 23 | 22 |
| 1890 | 25 | 26 | 26 | 25 | 26 | 25 | 23 | 24 | 27 | 26 | 25 | 25 | 27 |
| 1891 | 25 | 27 | 27 | 27 | 27 | 25 | 22 | 23 | 26 | 25 | 24 | 23 | 24 |
| 1892 | 21 | 26 | 25 | 24 | 24 | 20 | 19 | 19 | 22 | 23 | 22 | 20 | 23 |
| 1893 (Diagram 4, page 133.) | 20 | 21 | 21 | 20 | 20 | 19 | 18 | 18 | 21 | 21 | 20 | 20 | 20 |
| In 1893 Less than Av. 1877-92 | 8 | 7 | 8 | 9 | 8 | 8 | 7 | 9 | 9 | 9 | 8 | 7 | 7 |
| In 1893 Less than Av. 1886-92* | 4 | 4 | 5 | 6 | 6 | 5 | 4 | 6 | 5 | 5 | 4 | 3 | 4 |

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* This last comparison is made because of the change in the plan of making the reports, which occurred in May, 1885, as explained on pages 82-83.

## RELATIONS OF TOTAL AMOUNT OF SICKNESS TO METEOROLOGICAL CONDITIONS.

PROPOSITION 1.—That in months when **more** than the average per cent of weekly reports stated the presence of such of the 28 diseases tabulated (in tables on pages 97–111) as were reported present, the relative humidity of the atmosphere, the average per cent of cloudiness, the ozone, the average velocity of the wind, the monthly and the average daily range of the barometer, were **greater** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of said diseases those conditions were **less** than the average for the year. In Exhibit XXVIII. page 148, the letter *a* marks exceptions to this proposition for the year 1893.

PROPOSITION 2.—That in months when **more** than the average per cent of weekly reports stated the presence of such of the twenty-eight diseases tabulated as were reported present, the average daily temperature, the average daily range of temperature, the absolute humidity of the atmosphere, and the average daily pressure of the atmosphere, were **less** than the average for the year; and in months when **less** than the average per cent of reports stated the presence of said diseases those conditions were **greater** than the average for the year. In Exhibit XXVIII., page 148, the letter *b* marks exceptions to this proposition for the year 1893.

What per cent of the weekly reports received in 1893 (on an average for such of the tabulated diseases as were reported present) stated presence of the diseases is graphically represented by months in Diagram 4, page 133.

Exhibit XXVIII., continued for a series of years, should show what meteorological conditions are on the whole most conducive to health in Michigan, and what are most to be guarded against by residents of Michigan.

EXHIBIT XXVIII.—AVERAGE DISEASE.—*Stating for the Year and for each Month of the Year 1893, what Per Cent of the Weekly Reports of Sickness Stated Presence of Average Disease, and what were the Meteorological Conditions as observed at Stations in Michigan.**

| AVERAGE DISEASE. | | | | Temperature, F. | | Humidity of Air.§ Av. of 3 Daily Observations. | | Vapor Inhaled and Exhaled from the air Passages by one Person in 24 Hours, Troy Ounces. | | Average Per Cent of Cloudiness. | Ozone, Relative Scale of 10°. | | Av. Velocity of Wind, Miles per Hour by Anemometer. | Atmospheric Pressure, inches Reduced to 32° F. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Months in Order of Greatest Per Cent of Weekly Reports Stating Presence of. | | Per Cent of Weekly Reports Stating Presence of. | Av. Order of Prevalence where present. †, ‡. | Av. Daily Range by Registering Thermometers. | Average of Three Daily Observations. | Relative Per Cent of saturation. | Absolute,—Grains of Vapor in a Cubic Foot of Air. | Inhaled.‖ | Exhaled in excess of that Inhaled.¶ | | Day Observation, 7 A. M. to 2 P. M. | Night Observation, 9 P. M. to 7 A. M. | | Range. | | Average Pressure. |
| | | | | | | | | | | | | | | Monthly and for Year. | Av. Daily by 3 Daily Observations.** | |
| More than Av. Per Cent of Average Disease. | Feb. | 21 | 2.9 | *b*18.20 | 20.09 | 88 | 1.42 | .89 | 10.79 | 65 | 4.54 | 4.92 | 11.7 | 1.482 | .366 | *b* 29.124 |
| | Jan. | 21 | 3.1 | 15.05 | 15.23 | 89 | 1.19 | .74 | 10.94 | 76 | 4.02 | *a* 4.03 | *a* 9.7 | 1.110 | .253 | 28.977 |
| | Aug. | 21 | 3.1 | *b*22.12 | *b*68.57 | *a* 70 | *b* 5.58 | 3.49 | 8.19 | *a* 30 | 4.56 | 4.56 | *a* 7.6 | *a* .489 | *a* .123 | *b* 29.111 |
| | Sept. | 21 | 3.2 | *b*20.36 | *b*60.40 | *a* 75 | *b* 4.78 | 2.99 | 8.69 | *a* 43 | *a* 3.34 | *a* 3.24 | *a* 9.2 | *a* .616 | *a* .167 | *b* 29.086 |
| | Mar. | 20 | 3.0 | 16.64 | 30.61 | 84 | 2.03 | 1.27 | 10.41 | 56 | 4.30 | 4.92 | 11.7 | 1.066 | .290 | *b* 29.067 |
| | Oct. | 20 | 3.0 | 17.27 | *b*50.59 | 79 | *b* 3.72 | 2.33 | 9.35 | *a* 47 | *a* 3.70 | *a* 3.91 | 10.6 | 1.256 | *a* .225 | *b* 29.079 |
| | April | 20 | 3.1 | 16.32 | 43.19 | *a* 73 | 2.77 | 1.78 | 9.95 | 68 | 3.92 | 4.62 | 13.2 | 1.138 | .288 | 29.000 |
| | Nov. | 20 | 3.1 | 14.28 | 36.61 | 82 | 2.37 | 1.48 | 10.20 | 65 | *a* 3.03 | *a* 3.28 | 11.3 | 1.135 | *a* .213 | 29.059 |
| Av. | | 20 | 3.3 | 17.92 | 45.64 | 79 | 3.51 | 2.19 | 9.49 | 54 | 3.91 | 4.20 | 10.2 | .969 | .227 | 29.060 |
| Less than Av. Per Ct. of Av. Disease. | Dec. | 20 | 3.4 | *b*14.31 | *b*26.88 | *a* 88 | *b* 1.83 | 1.14 | 10.54 | *a* 80 | 3.81 | *a* 4.53 | *a* 11.7 | *a*1.313 | *a* .329 | 29.093 |
| | May | 19 | 2.9 | 19.20 | 54.30 | 72 | 3.83 | 2.39 | 9.29 | 50 | *a* 4.18 | *a* 4.55 | 9.8 | .955 | .175 | *b* 28.982 |
| | June | 18 | 2.8 | 20.52 | 69.05 | 74 | 6.12 | 3.83 | 7.85 | 34 | *a* 3.93 | 4.15 | 8.2 | .591 | .138 | 29.066 |
| | July | 18 | 2.8 | 20.75 | 72.16 | 72 | 6.50 | 4.06 | 7.62 | 38 | 3.50 | 3.66 | 8.2 | .487 | .151 | 29.077 |

*, †, ‡ §, ‖, ¶, **. For foot-notes with these marks, see Exhibit X, page 123.
*a* An exception to proposition 1, relating to Average Disease, on page 147.
*b* An exception to proposition 2, relating to Average Disease, on page 147.

# COMMUNICABLE DISEASES IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1893.

COMPILED UNDER THE DIRECTION OF THE SECRETARY OF THE STATE BOARD OF HEALTH.

This paper continues a subject treated for the preceding year on pages 149–324 of the Report of the State Board of Health for the year 1893, and for former years in the Reports for those years respectively.

Whenever information is received at this office of the outbreak (in any locality in Michigan) of diphtheria, scarlet fever, typhoid fever, small-pox, measles, German measles (rötheln), whooping-cough, rabies, or glanders, a letter is sent to the health officer of the township, city or village in which the disease is reported to be present (if the name of the health officer has been reported to this office; if not, to the president of the Board of Health), calling his attention (if the report was not received from him) to the reported existence of the disease within his territory, indicating his duties and powers and the proper measures to be taken in restricting the disease, transmitting documents of instruction with regard to prevention and restriction of the disease, for distribution among families especially exposed to it,* and asking for a report of the methods employed for the restriction of the disease, and the results of efforts for suppressing it, also the number of cases and deaths in each outbreak. In the case of typhoid fever, a printed letter was used (form [162.]) which is reproduced in Part I. of this Report. In the case of measles a hektographed letter was used. In the case of diphtheria, scarlet fever, and small-pox the letter generally sent during the year 1893 was substantially the same as that printed on pages 251–252 of the Report of the State Board of Health for the year 1884, except that about a dozen questions were added. With this letter in each instance, there was sent a blank form (L) for the notice of the first case of a dangerous communicable disease, and a blank form (M) for weekly reports during the continuance of the disease. After the outbreak was over, there was sent a blank form (K) or (O) for special final report. Blanks (L) and (M) now in use are substantially the same as those printed on pages 253–254 of the Report for 1884. The blank (K) for final report is printed on pages xiii–xiv of the Report of this Board, for 1888; but the present blank is more complete. The blank (O) is for typhoid fever, and was first used in September, 1890, and is printed in Part I. of this report.

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* It is believed that these documents distributed in this manner are doing great good; for the neighbors of the sick are sufficiently alarmed to read the documents, and are thus led to co-operate in stamping out the disease.

Some evidence of the value of this work may be seen further on in this article, in tables which show the estimated number of outbreaks of, and cases of sickness from communicable diseases prevented and lives saved by isolation and disinfection.

The information contained in the above-mentioned blanks when filled and returned to this office by the health officers of localities where dangerous communicable diseases have existed, together with other correspondence in regard to outbreaks of such diseases, are the bases on which the various statements made in this article are founded.

The increasingly large number of replies received in answer to communications in regard to contagious diseases, the general desire manifested by health officers for documents on the restriction of communicable diseases, and the general care taken to send complete reports to this office, show an increasing interest among the people, and a commendable effort on the part of the local health authorities to have every means employed to prevent the spread of communicable diseases. The number of communications which annually pass to and from this office relative to dangerous communicable diseases, has increased greatly during the last few years.

## DEFINITION OF THE TERM "OUTBREAK."

For studying the influence of isolation and disinfection in restricting outbreaks of communicable diseases, an outbreak is considered as the existence of one or more cases of a particular communicable disease, within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be clearly traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. Heretofore, when a period of sixty days or over has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak has been considered ended. Possibly the sixty-days limit may be changed to ninety days; but in order to study the subject systematically, there must be a limit in time, as also in area.

TABLE 1.—*Number of Places in Michigan at which Communicable Diseases were Reported Present During each Week in 1893.*

| Weeks ending :— | | Diphtheria. | Scarlet Fever. | Typhoid Fever. | Measles. | Small-pox. |
|---|---|---|---|---|---|---|
| January | 7 | 45 | 65 | 28 | 19 | 0 |
| | 14 | 48 | 67 | 28 | 29 | 1 |
| | 21 | 38 | 55 | 18 | 27 | 2 |
| | 28 | 34 | 71 | 24 | 38 | 2 |
| February | 4 | 38 | 72 | 18 | 28 | 2 |
| | 11 | 42 | 51 | 21 | 37 | 1 |
| | 18 | 31 | 44 | 14 | 35 | 1 |
| | 25 | 30 | 35 | 13 | 41 | 0 |
| March | 4 | 34 | 43 | 13 | 35 | 0 |
| | 11 | 37 | 54 | 18 | 34 | 0 |
| | 18 | 27 | 44 | 12 | 30 | 0 |
| | 25 | 20 | 49 | 15 | 22 | 0 |
| April | 1 | 21 | 45 | 10 | 30 | 0 |
| | 8 | 23 | 51 | 9 | 22 | 0 |
| | 15 | 26 | 49 | 11 | 34 | 0 |
| | 22 | 25 | 43 | 10 | 28 | 0 |
| | 29 | 26 | 44 | 10 | 34 | 0 |
| May | 6 | 26 | 52 | 13 | 26 | 0 |
| | 13 | 22 | 43 | 8 | 27 | 0 |
| | 20 | 37 | 45 | 13 | 29 | 0 |
| | 27 | 48 | 42 | 13 | 31 | 0 |
| June | 3 | 48 | 40 | 11 | 28 | 0 |
| | 10 | 41 | 37 | 16 | 35 | 0 |
| | 17 | 34 | 38 | 16 | 21 | 0 |
| | 24 | 34 | 36 | 12 | 22 | 0 |
| July | 1 | 36 | 27 | 17 | 16 | 0 |
| | 8 | 34 | 33 | 16 | 24 | 0 |
| | 15 | 34 | 36 | 17 | 20 | 0 |
| | 22 | 32 | 37 | 20 | 17 | 0 |
| | 29 | 33 | 36 | 19 | 15 | 0 |
| August | 5 | 27 | 36 | 27 | 12 | 0 |
| | 12 | 38 | 27 | 33 | 9 | 0 |
| | 19 | 41 | 24 | 34 | 11 | 0 |
| | 26 | 39 | 36 | 41 | 10 | 0 |
| September | 2 | 29 | 38 | 35 | 13 | 0 |
| | 9 | 31 | 38 | 36 | 4 | 0 |
| | 16 | 31 | 40 | 48 | 6 | 0 |
| | 23 | 26 | 38 | 46 | 4 | 0 |
| | 30 | 23 | 29 | 43 | 3 | 0 |
| October | 7 | 33 | 32 | 53 | 4 | 0 |
| | 14 | 35 | 43 | 61 | 3 | 0 |
| | 21 | 37 | 41 | 58 | 4 | 0 |
| | 28 | 31 | 39 | 63 | 5 | 0 |
| November | 4 | 31 | 45 | 54 | 7 | 0 |
| | 11 | 32 | 43 | 55 | 7 | 0 |
| | 18 | 38 | 42 | 48 | 6 | 0 |
| | 25 | 48 | 51 | 36 | 6 | 0 |
| December | 2 | 31 | 48 | 26 | 6 | 0 |
| | 9 | 22 | 46 | 30 | 8 | 0 |
| | 16 | 24 | 57 | 20 | 11 | 0 |
| | 23 | 21 | 48 | 20 | 10 | 0 |
| | 30 | 18 | 35 | 19 | 6 | 0 |
| Average number of places per week | | 32.40 | 43.44 | 25.94 | 18.92 | .17 |

# DIPHTHERIA IN MICHIGAN.—YEAR ENDING DECEMBER 31, 1893.

During the year ending December 31, 1893, there were reported to the Secretary of the State Board of Health 546 outbreaks of diphtheria in 460 localities in Michigan, which resulted in 4,736 cases and 1,092 deaths. Notwithstanding the marked improvement which the State Board of Health has succeeded in bringing about both in promptness and accuracy of reports of local health officials to the central office, it is still probable that not all cases of and deaths from diphtheria are yet reported. For the year 1893 there were reported to the Secretary of State 959 deaths from diphtheria, or 133 less* than were reported to this Office; and the Secretary of the State Board of Health estimates that the deaths reported to the Secretary of State should be increased by about 40 per cent to equal the actual number of deaths which occur; and according to this estimate, there were about 1,343 deaths from diphtheria during 1893, in Michigan, instead of 1,092, as reported to the State Board of Health.

### DISTRIBUTION OF DIPHTHERIA IN 1893.

The following Tables, 1 and 2, and accompanying map, exhibit, in different ways, the distribution of the reported diphtheria in Michigan, in 1893. Table 1 shows that the sickness-rate from this disease, for the year, for the whole State, was 21.5 cases per 10,000 of estimated population; and that the death-rate per same number of inhabitants, was 5.0. Table 1, shows also that the greatest sickness-rate from this disease in 1893, was in Roscommon county, where the ratio of cases to population was 805.25 to 10,000. Other counties where the sickness-rates were largely in excess of the average rate for the State, were: Alcona, 151.52; Bay, 131.34; Iosco, 113.32; Otsego, 79.33; Presque Isle, 77.94; Dickinson, 78.51; Lake, 66.13; cases per 10,000 of population. The lowest sickness-rate for the year, .96 of one case per 10,000 of population, was in Isabella county. Other counties whose sickness-rates were much *below* the average for the State, were: Clare, 1.27; Delta, 1.64; Marquette, 1.84; Manistee, 2.33; Midland, 2.38; Gogebic, 2.88 cases per 10,000 of population. The greatest death-rate from this disease during the year, 205.59 deaths per 10,000 of population, was in Roscommon county. Other counties where the death-rates were much above the average death-rate for the State, were: Alcona, 59.13; Crawford, 28.84; Otsego, 23.58; Bay, 19.64; Iosco, 19.14; Dickinson, 17.69; Huron, 15.00; Lake, 13.22 and Cheboygan, 12.66 deaths per 10,000 of population. The lowest death-rate, .43 of one death per 10,000 of population, was in Calhoun county. Other counties where the death-rates were far *below* the average death-rate for the State, were: Livingston, .48; Oceana, .61; Gogebic, .72; Midland, .79; St. Joseph, .79; Antrim, .83 of one death per 10,000 of population. From the following thirteen counties: Alger, Baraga, Gladwin, Iron, Isle Royal, Keweenaw, Leelanaw, Luce, Manitou, Missaukee, Newaygo, Oscoda and Schoolcraft,—having an aggregate population of 64,689, no diphtheria was reported during the year. From Clare, Delta, Isabella and Manistee counties, there was an aggregate of twelve cases of diphtheria reported, with no deaths.

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* The excess of deaths from diphtheria here shown over the number reported to the Secretary of State, is probably due to the fact that some deaths reported to this office as from *diphtheritic croup* were compiled as from diphtheria, whereas in the Secretary of State's Office they were not so classified.

The proportionate fatality from diphtheria in 1893, *i. e.*, the proportion of reported cases which proved fatal, was, for the whole State, 23 per cent, or about one death to 4.35 cases. The maximum fatality (71 per cent of reported cases) occurred in Marquette county. The minimum fatality (10 per cent of reported cases) occurred in Antrim, Genesee, Livingston and Oceana counties. Other counties where the fatality was considerably *less* than the average fatality for the State, were: Menominee, 11; Calhoun, 12; Arenac, 13; and Ogemaw, 14 per cent of reported cases. Other counties where the fatality was much *greater* than the average for the State, were: Crawford, 53; Chippewa and Mecosta, 45; Berrien, 44; and Cheboygan, 43 per cent of reported cases.

Although the sickness and death *rates* were higher for this year in Roscommon county, than in any other county in the State, the fatality in this county was only 26 per cent of the reported cases, or about 3 per cent more than the average for the State.

The map which follows Table 1, shows for each county of the State the sickness and death rates per 10,000 of population; the number of localities where the disease was present during the year, and the number of outbreaks which occurred in those localities. A definition of the term outbreak is printed on page 150.

Table 2 exhibits the latitudinal distribution of diphtheria throughout the State, by tiers of counties; all the counties of the Upper Peninsula considered as one tier. By this table (2), it appears that the lowest sickness-rate (3.90 per 10,000 of population) was in the center tier of counties; and that the extreme southern and northern tiers of counties were next in lowest sickness rates, they being respectively 11.83 and 14.20 per 10,000 of population. The tier of counties having the greatest sickness-rate (69.05 per 10,000 of population) was the seventh. Other tiers in which the sickness-rates were largely above the average, were the eighth with 48.90, and the ninth with 40.65 cases per 10,000 of population.

The sickness-rate in the second tier of counties, as may be seen in the table, was 16.72 cases per 10,000 of population. In the city of Detroit, situated in this tier, the rate was 27.78 per 10,000, and in the tier, excluding Detroit, the rate was only 6.99 per 10,000. In the fourth tier of counties, in which is situated the city of Grand Rapids, the sickness-rate per 10,000 of population, was 21.20 cases. In the city of Grand Rapids the rate was 28.00, and in the tier of counties, excluding Grand Rapids, it was 19.5Q cases per 10,000 of population. In the seventh tier of counties, *including* Bay City, the sickness-rate was 69.05 per 10,000 of population. In Bay City the rate was 241.12, and in the tier of counties, *excluding* Bay City, the rate was only 27.60 per 10,000.

TABLE 1.—*Numbers of Cases and Deaths reported from Diphtheria per 10,000 persons living in each county in Michigan during the year 1893. (Compiled from reports of health officers, clerks, etc.)*

| Counties. | Estimated* population for 1893. | Number of reported Cases. | Number of reported Deaths. | Number per 10,000 population, of Cases. | Number per 10,000 population, of Deaths. |
|---|---|---|---|---|---|
| State | 2,204,563 | 4,736 | 1,092 | 21.5 | 5.00 |
| Alcona | 5,411 | 82 | 32 | 151.52 | 59.13 |
| Alger | 1,348 | 0 | 0 | .00 | .00 |
| Allegan | 39,129 | 47 | 19 | 12.01 | 4.85 |
| Alpena | 17,182 | 46 | 13 | 26.77 | 7.56 |
| Antrim | 11,924 | 10 | 1 | 8.38 | .83 |
| Arenac | 6,627 | 16 | 2 | 24.14 | 3.01 |
| Baraga | 3,933 | 0 | 0 | .00 | .00 |
| Barry | 23,720 | 55 | 14 | 23.18 | 5.90 |
| Bay | 60,072 | 789 | 118 | 131.34 | 19.64 |
| Benzie | 7,354 | 12 | 3 | 16 30 | 4.07 |
| Berrien | 44,542 | 43 | 19 | 9.65 | 4.36 |
| Branch | 26,351 | 42 | 10 | 15.93 | 3.79 |
| Calhoun | 46,479 | 17 | 2 | 3.65 | .43 |
| Cass | 21,120 | 12 | 5 | 5.68 | 2.36 |
| Charlevoix | 10,620 | 8 | 3 | 7.53 | 2.82 |
| Cheboygan | 13,419 | 40 | 17 | 29.80 | 12.66 |
| Chippewa | 14,494 | 11 | 5 | 7.58 | 3.44 |
| Clare | 7,871 | 1 | 0 | 1.27 | .00 |
| Clinton | 26,324 | 67 | 15 | 25.45 | 5.69 |
| Crawford | 2,773 | 15 | 8 | 54.09 | 28.84 |
| Delta | 18,277 | 3 | 0 | 1.64 | .00 |
| Dickinson | 14,774 | 116 | 26 | 78.51 | 17.69 |
| Eaton | 32,483 | 19 | 4 | 5.84 | 1.28 |
| Emmet | 9,975 | 6 | 2 | 6.01 | 2.00 |
| Genesee | 40,272 | 51 | 5 | 12.66 | 1.24 |
| Gladwin | 4,727 | 0 | 0 | .00 | .00 |
| Gogebic | 13,854 | 4 | 1 | 2.88 | .72 |
| Gd. Traverse | 16,474 | 29 | 5 | 17.60 | 3.03 |
| Gratiot | 28,745 | 9 | 3 | 3.13 | 1.04 |
| Hillsdale | 30,368 | 61 | 16 | 20.08 | 5.26 |
| Houghton | 41,978 | 45 | 8 | 10.71 | 1.90 |
| Huron | 31,323 | 151 | 47 | 48.20 | 15.00 |
| Ingham | 39,183 | 133 | 27 | 33.94 | 6.88 |
| Ionia | 34,313 | 38 | 10 | 11.07 | 2.91 |
| Iosco | 13,060 | 148 | 25 | 113.32 | 19.14 |
| Iron | 4,974 | 0 | 0 | .00 | .00 |
| Isabella | 20,775 | 2 | 0 | .96 | .00 |
| Isle Royal | ........ | ..... | .... | ..... | ..... |
| Jackson | 46,153 | 32 | 8 | 6.93 | 1.73 |
| Kalamazoo | 41,360 | 38 | 4 | 9.18 | .96 |
| Kalkaska | 5.518 | 22 | 4 | 39.86 | 7.24 |
| Kent | 118,920 | 288 | 55 | 24.21 | 4.62 |
| Keweenaw | 2,827 | 0 | 0 | .00 | .00 |
| Lake | 6,048 | 40 | 8 | 66.13 | 13.22 |
| Lapeer | 28,959 | 25 | 5 | 8.63 | 1.72 |
| Leelanaw | 9,032 | 0 | 0 | .00 | .00 |
| Lenawee | 48,518 | 34 | 9 | 7.00 | 1.85 |
| Livingston | 20,541 | 10 | 1 | 4.86 | .48 |
| Luce | 2,875 | 0 | 0 | .00 | .00 |
| Mackinac | 7,385 | 10 | 2 | 13.54 | 2.70 |
| Macomb | 32,240 | 68 | 26 | 21.09 | 8.06 |
| Manistee | 25,642 | 6 | 0 | 2.33 | .00 |
| Manitou | 903 | 0 | 0 | .00 | .00 |
| Marquette | 38,004 | 7 | 5 | 1.84 | 1.31 |
| Mason | 17,910 | 32 | 5 | 17.86 | 2.79 |
| Mecosta | 20,472 | 20 | 9 | 9.76 | 4.34 |
| Menominee | 22,945 | 85 | 9 | 37.04 | 3.92 |
| Midland | 12,582 | 3 | 1 | 2.38 | .79 |
| Missaukee | 6,479 | 0 | 0 | .00 | .00 |
| Monroe | 32,969 | 65 | 16 | 19.71 | 4.85 |
| Montcalm | 33,776 | 23 | 6 | 6.80 | 1.77 |
| Montmorency | 2,198 | 3 | 1 | 13.64 | 4.54 |
| Muskegon | 37,996 | 110 | 28 | 28.95 | 7.36 |
| Newaygo | 19,462 | 0 | 0 | .00 | .00 |
| Oakland | 42,312 | 27 | 5 | 6.38 | 1.11 |
| Oceana | 16,372 | 10 | 1 | 6.10 | .61 |
| Ogemaw | 5,623 | 21 | 3 | 37.34 | 5.33 |
| Ontonagon | 6,094 | 3 | 1 | 4.92 | 1.64 |
| Osceola | 16,014 | 11 | 2 | 6.86 | 1.24 |
| Oscoda | 1,829 | 0 | 0 | .00 | .00 |
| Otsego | 4,664 | 37 | 11 | 79.33 | 23.58 |
| Ottawa | 38,146 | 49 | 16 | 12.84 | 4.19 |
| Presque Isle | 5,604 | 42 | 17 | 77.94 | 3 03 |
| Roscommon | 1,751 | 141 | 36 | 805.25 | 205.59 |
| Saginaw | 81,949 | 238 | 36 | 29.04 | 4.03 |
| Sanilac | 33,605 | 40 | 14 | 11.9 | 4.16 |
| Schoolcraft | 6,800 | 0 | 0 | .00 | .00 |
| Shiawassee | 32,358 | 85 | 16 | 26.20 | 4.94 |
| St. Clair | 53,763 | 188 | 43 | 34.96 | 7.99 |
| St. Joseph | 25,154 | 14 | 2 | 5.56 | .79 |
| Tuscola | 33,935 | 40 | 10 | 11.78 | 2.94 |
| Van Buren | 30,930 | 14 | 4 | 4.52 | 1.29 |
| Washtenaw | 43,171 | 25 | 12 | 5.79 | 2.77 |
| Wayne | 283,650 | 696 | 194 | 24.53 | 6 83 |
| Wexford | 13,355 | 6 | 2 | 4.49 | 1.49 |

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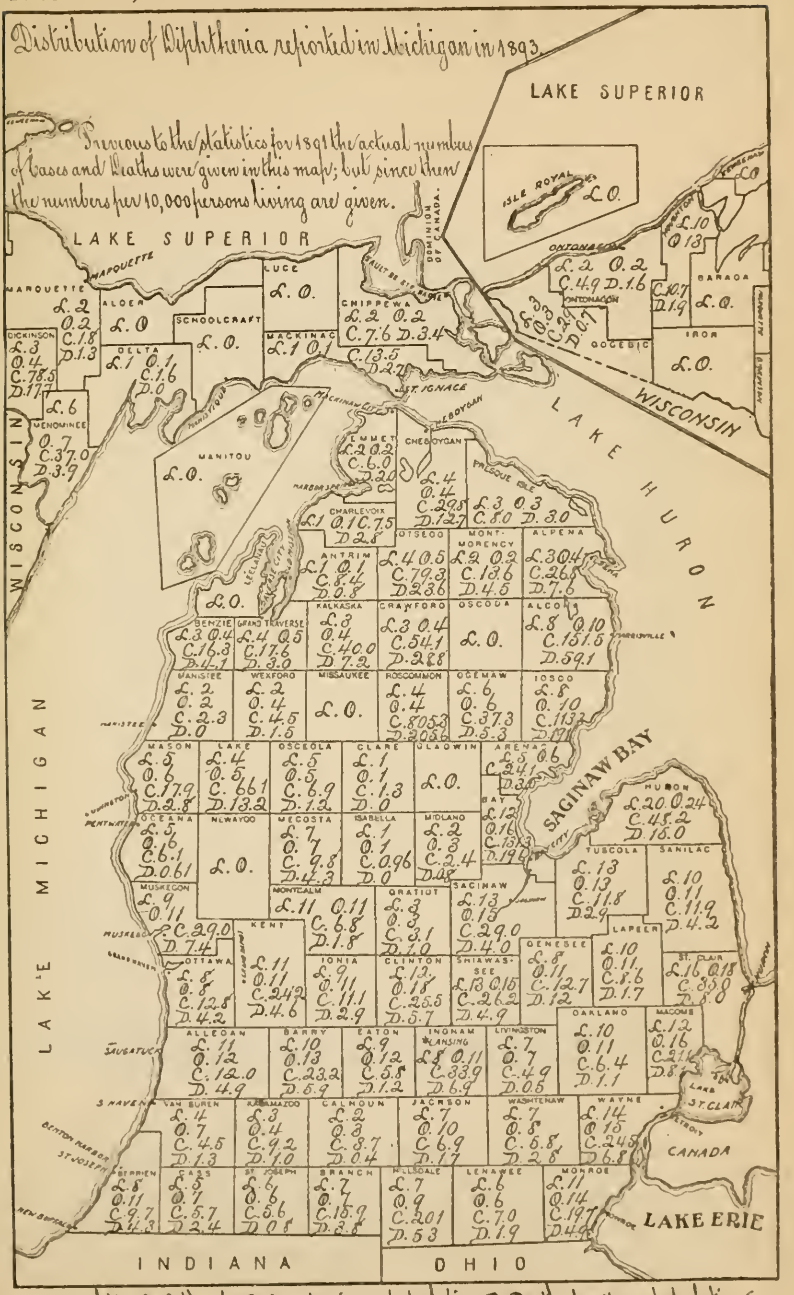
* By Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan, "State Department." Estimate based on United States census of 1890, and the State census of 1894. "Vital Statistics" 1893, pp. 17–19.

## DISTRIBUTION OF DIPHTHERIA IN MICHIGAN IN 1893.

BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.


Distribution of Diphtheria reported in Michigan in 1893.
Previous to the statistics for 1891 the actual numbers of Cases and Deaths were given in this map; but since then the numbers per 10,000 persons living are given.
LAKE SUPERIOR
LAKE SUPERIOR
ISLE ROYALE L.O.
DOMINION OF CANADA.
MARQUETTE
MARQUETTE L.2 O.2 C.1.8 D.1.3
ALGER L.O
LUCE L.O.
SCHOOLCRAFT L.O.
DICKINSON L.3 O.4 C.78.5 D.17.7
DELTA L.1 O.1 C.1.6 D.0
MACKINAC L.1 O.1
CHIPPEWA L.2 O.2 C.7.6 D.3.4 C.13.5 D.2.7
SAULT DE STE MARIE
L.6
MENOMINEE O.7 C.37.0 D.3.9
MANISTIQUE
ST. IGNACE
MACKINAW CITY
CHEBOYGAN
HOUGHTON L.10 O.13 C.10.7 D.1.9
KEWEENAW L.O
ONTONAGON L.2 O.2 C.4.9 D.1.6
ONTONAGON
GOGEBIC L.3 O.3 C.2.9 D.0.7
BARAGA L.O.
IRON L.O.
MARQUETTE
MENOMINEE
WISCONSIN
MANITOU L.O.
EMMET L.2 O.2 C.6.0 D.2.0
HARBOR SPRINGS
CHEBOYGAN L.4 O.4 C.29.8 D.12.7
PRESQUE ISLE L.3 O.3 C.8.0 D.3.0
CHARLEVOIX L.1 O.1 C.7.5 D.2.8
LEELANAU L.O.
ANTRIM L.1 O.1 C.8.4 D.0.8
OTSEGO L.4 O.5 C.79.3 D.23.6
MONTMORENCY L.2 O.2 C.13.6 D.4.5
ALPENA L.3 O.4 C.26.8 D.7.6
ALPENA
BENZIE L.3 O.4 C.16.3 D.4.1
GRAND TRAVERSE L.4 O.5 C.17.6 D.3.0
TRAVERSE CITY
KALKASKA L.3 O.4 C.40.0 D.7.2
CRAWFORD L.3 O.4 C.54.1 D.28.8
OSCODA L.O.
ALCONA L.8 O.10 C.151.5 D.59.1
HARRISVILLE
MANISTEE L.2 O.2 C.2.3 D.0
MANISTEE
WEXFORD L.2 O.4 C.4.5 D.1.5
MISSAUKEE L.O.
ROSCOMMON L.4 O.4 C.805.3 D.205.6
OGEMAW L.6 O.6 C.37.3 D.5.3
IOSCO L.8 O.10 C.113.2 D.19.1
MASON L.5 O.6 C.17.9 D.2.8
LUDINGTON
LAKE L.4 O.5 C.66.1 D.13.2
OSCEOLA L.5 O.5 C.6.9 D.1.2
CLARE L.1 O.1 C.1.3 D.0
GLADWIN L.O.
ARENAC L.5 O.6 C.24.1 D.3.0
SAGINAW BAY
HURON L.20 O.24 C.45.2 D.16.0
PENTWATER
OCEANA L.5 O.6 C.6.1 D.0.61
NEWAYGO L.O.
MECOSTA L.7 O.7 C.9.8 D.4.3
ISABELLA L.1 O.1 C.0.96 D.0
MIDLAND L.2 O.3 C.2.4 D.0.8
BAY L.12 O.16 C.13.3 D.1.96
BAY CITY
TUSCOLA L.13 O.13 C.11.8 D.2.9
SANILAC L.10 O.11 C.11.9 D.4.2
MUSKEGON L.9 O.11 C.29.0 D.7.4
MUSKEGON
MONTCALM L.11 O.11 C.6.8 D.1.8
GRATIOT L.3 O.3 C.3.1 D.1.0
SAGINAW L.13 O.15 C.29.0 D.4.0
LAPEER L.10 O.11 C.8.6 D.1.7
GRAND HAVEN
KENT
GRAND RAPIDS
OTTAWA L.8 O.8 C.12.8 D.4.2
KENT L.11 O.11 C.24.2 D.4.6
IONIA L.9 O.11 C.11.1 D.2.9
CLINTON L.12 O.18 C.25.5 D.5.7
SHIAWASSEE L.13 O.15 C.26.2 D.4.9
GENESEE L.8 O.11 C.12.7 D.1.2
ST. CLAIR L.16 O.18 C.35.8 D.8.0
PORT HURON
OAKLAND L.10 O.11 C.6.4 D.1.1
MACOMB L.12 O.16 C.21.1 D.8.1
SAUGATUCK
ALLEGAN L.11 O.12 C.12.0 D.4.9
BARRY L.10 O.13 C.23.2 D.5.9
EATON L.9 O.12 C.5.8 D.1.2
INGHAM LANSING L.8 O.11 C.33.9 D.6.9
LIVINGSTON L.7 O.7 C.4.9 D.0.5
LAKE ST. CLAIR
S. HAVEN
VAN BUREN L.4 O.7 C.4.5 D.1.3
KALAMAZOO L.3 O.4 C.9.2 D.1.0
CALHOUN L.2 O.3 C.3.7 D.0.4
JACKSON L.7 O.10 C.6.9 D.1.7
WASHTENAW L.7 O.8 C.5.8 D.2.8
WAYNE L.14 O.15 C.24.5 D.6.8
DETROIT
CANADA
BENTON HARBOR
ST JOSEPH
BERRIEN L.8 O.11 C.9.7 D.4.3
CASS L.5 O.7 C.5.7 D.2.4
ST JOSEPH L.6 O.6 C.5.6 D.0.8
BRANCH L.7 O.7 C.15.9 D.3.8
HILLSDALE L.7 O.9 C.20.1 D.5.3
LENAWEE L.6 O.6 C.7.0 D.1.9
MONROE L.11 O.14 C.19.7 D.4.9
MONROE
NEW BUFFALO
LAKE ERIE
WISCONSIN
LAKE MICHIGAN
LAKE HURON
INDIANA
OHIO

L. = Localities: O. = Outbreaks; C. = Cases per 10,000 population; D. = Deaths per 10,000 population.

[PLATE 775]

TABLE 2.—*Exhibiting the Estimated Population of Michigan for the year 1893, by tiers of counties (Upper Peninsula as one tier); also the number of cases of Diphtheria* REPORTED *from each of these divisions for 1893, and the number of cases per 10,000 estimated population of each division.*

| Counties in Groups, most Northern ones First. | | Estimated Population, 1893.* | Reported Cases of Diphtheria, 1893. | Average Reported Cases per 10,000 of Estimated Population. |
|---|---|---|---|---|
| State | | 2,204,563 | 4,736 | 21.5 |
| Upper Peninsula | Alger. Mackinac. Houghton. Marquette.<br>Delta. Chippewa. Ontonagon. Iron.<br>Schoolcraft. Isle Royal. Gogebic. Menominee.<br>Luce. Keweenaw. Baraga. Dickinson. | 200,062 | 284 | 14.20 |
| Eleventh tier of counties | Manitou.<br>Emmet. Cheboygan.<br>Charlevoix. Presque Isle. | 40,521 | 96 | 23.69 |
| Tenth tier of counties | Leelanaw.<br>Antrim.<br>Otsego. Alpena.<br>Montmorency. | 45,000 | 96 | 21.33 |
| Ninth tier of counties | Benzie. Crawford.<br>G'd Traverse. Oscoda.<br>Kalkaska. Alcona. | 39,359 | 160 | 40.65 |
| Eighth tier of counties | Manistee.<br>Wexford. Ogemaw.<br>Missaukee. Iosco.<br>Roscommon. | 65,910 | 322 | 48.90 |
| Seventh tier of counties | Mason. Gladwin.<br>Lake. Bay.<br>Osceola. Huron.<br>Clare. Arenac. | 150,592 | 1,040 | 69 05 |
| Sixth tier of counties | Oceana.<br>Newaygo.<br>Mecosta. Midland.<br>Isabella. | 89,663 | 35 | 3.90 |
| Fifth tier of counties | Muskegon.<br>Montcalm. Tuscola.<br>Gratiot. Sanilac.<br>Saginaw. | 250,006 | 460 | 18.40 |
| Fourth tier of counties | Ottawa. Shiawassee.<br>Kent. Genesee.<br>Ionia. Lapeer.<br>Clinton. St. Clair. | 373,055 | 791 | 21.20 |
| Third tier of counties | Allegan.<br>Barry. Livingston.<br>Eaton. Oakland.<br>Ingham. Macomb. | 229,608 | 359 | 15.64 |
| Second tier of counties | Van Buren.<br>Kalamazoo. Washtenaw.<br>Calhoun. Wayne.<br>Jackson. | 491,743 | 822 | 16.72 |
| First tier of counties | Berrien.<br>Cass. Hillsdale.<br>St. Joseph. Lenawee.<br>Branch. Monroe. | 229,022 | 271 | 11.83 |

* Estimated by Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan, "State Department." Estimate based on the United States census of 1890, and the State census of 1894.—"Vital Statistics" 1893, pp. 17-19.

## DIPHTHERIA IN 1893, COMPARED WITH PREVIOUS YEARS.

Comparisons with previous years, to ascertain the comparative increase or decrease of prevalence of this disease in the State, would no doubt be interesting and instructive if there existed a fixed basis on which to found such comparisons; but from year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports; and in the efforts made by local health authorities throughout the State to furnish in their reports the information desired by the State Board. It is therefore still impossible to determine the exact increase or decrease of prevalence of the disease in the State by comparison of the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom, reported to this office year by year; and this fact should be borne in mind in referring to Table 3.

TABLE 3.—DIPHTHERIA IN MICHIGAN.—*Numbers of Reported Outbreaks, Localities (in which they Occurred), Cases and Deaths; Average Numbers of Cases and Deaths Per Outbreak, and the Per Cent of cases which proved fatal, as reported for each of the Twelve Years, 1882–93; also Averages of the same for the Nine Years, 1884–92, and Comparisons of the Facts for 1893 with those for 1892 and with the Averages for the Nine Years, 1884–92.*

| Year. | Reported Outbreaks. | Reported Localities. | Reported Cases. | Average Cases per Outbreak. | Reported Deaths. | Average Deaths per Outbreak. | Deaths per 100 Cases. |
|---|---|---|---|---|---|---|---|
| 1882 | ........ | 163 | 2,046 | ........ | 495 | ........ | 24. |
| 1883* | ........ | 125 | 2,246 | ........ | 543 | ........ | 24. |
| 1884† | 362 | 302 | 3,915 | 10.8 | 905 | 2.5 | 23. |
| 1885 | 467 | 396 | 4,018 | 8.6 | 964 | 2. | 24. |
| 1886 | 550 | 422 | 4,244 | 7.7 | 982 | 1.8 | 23. |
| 1887 | 466 | 371 | 3,382 | 7.8 | 825 | 1.8 | 24.4 |
| 1888 | 337 | 283 | 2,228 | 6.6 | 532 | 1.6 | 23.9 |
| 1889 | 398 | 329 | 3,157 | 7.9 | 683 | 1.7 | 21.6 |
| 1890 | 442 | 365 | 4,206 | 9.5 | 1,050 | 2.4 | 25. |
| 1891 | 535 | 461 | 4,385 | 8.2 | 1,002 | 1.9 | 22.8 |
| 1892 | 527 | 463 | 4,818 | 9.1 | 1,099 | 2.1 | 22.8 |
| 1893 | 546 | 460 | 4,736 | 8.7 | 1,092 | 2.0 | 23.1 |
| Average for nine years, 1884-1892 | 454 | 377 | 3,817 | 8.4 | 894 | 2.0 | 23.4 |
| Variations in 1893 from 1892 | +19 | —3 | —82 | —.4 | —7 | —.1 | +.3 |
| Variations in 1893 from the average for 9 years, 1884-92 | +92 | +83 | +919 | +.3 | +193 | = | —.3 |

* The use of the blank form "M" for weekly reports was begun in May, 1883.
† In compiling diphtheria the use of the annual reports of health officers was begun in 1884.

The following table (4) and diagram (No. 1) giving the number of deaths from diphtheria, per 100,000 persons living, reported to the Secretary of State, probably quite accurately represent the annual fluctuations of, but not the total deaths from diphtheria in Michigan during the 26 years, 1868-93.

TABLE 4.—*Exhibiting the number of reported deaths from Diphtheria per 100,000 persons living in Michigan in each of the 26 years, 1868–93. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population estimated by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department.)*

| Year. | 1868. | 1869. | 1870. | 1871. | 1872. | 1873. | 1874. | 1875. | 1876. | 1877. | 1878. | 1879. | 1880. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deaths | 8.84 | 7.80 | 10.22 | 10.49 | 15.06 | 16.44 | 15.60 | 14.68 | 21.36 | 39.51 | 59.36 | 92.55 | 94.20 |
| Year. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. | 1892. | 1893. |
| Deaths | 122.61 | 81.93 | 56.76 | 58.53 | 56.50 | 58.45 | 47.78 | 35.81 | 41.40 | 60.46 | 49.54 | 46.67 | 43.50 |

*Reported Deaths from Diphtheria in Michigan, 26 Years, 1868–93.*

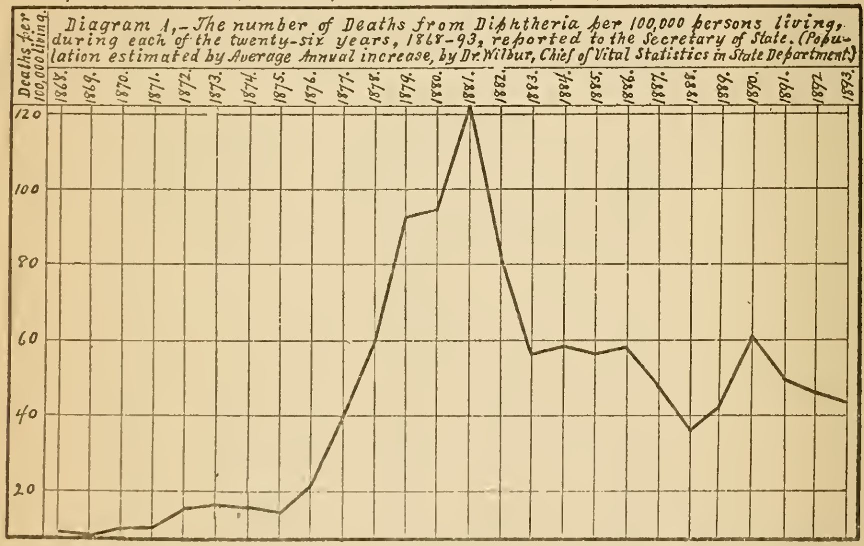


*Diagram 1, graphically represents Table 4 which supplies the figures in detail.*
Plate No. 768

DIPHTHERIA IN EACH MONTH OF THE YEAR, 1893.

TABLE 5.—*Exhibiting the reported number of outbreaks of Diphtheria which Began, the number which Ended, and the number which were Present, in each Month of the Year 1893, in the different local jurisdictions of Michigan.*

| Outbreaks: | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Outbreaks began | 98 | 42 | 29 | 37 | 50 | 31 | 36 | 45 | 36 | 49 | 35 | 28 | 516 |
| Outbreaks ended | 28 | 33 | 32 | 25 | 27 | 38 | 32 | 35 | 31 | 36 | 46 | 57 | 420 |
| Outbreaks present | 99 | 102 | 89 | 85 | 105 | 107 | 101 | 112 | 103 | 116 | 110 | 86 | ...... |

The last line of figures in table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. There may be a time during the outbreak when no cases are present, but if the subsequent cases can be attributed to infection from the preceding ones, it is called one outbreak. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 96 more beginnings than endings of outbreaks reported during the year 1893.

TABLE 6.—*Exhibiting the Number and Per Cent of Cases of Diphtheria present in Michigan in each Month during the Year 1893. (Includes each case for which, the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number cases present | 574 | 541 | 371 | 320 | 404 | 416 | 437 | 450 | 454 | 566 | 514 | 391 |
| Per cent of cases present | 10.6 | 9.9 | 6.8 | 5.9 | 7.4 | 7.6 | 8.0 | 8.3 | 8.3 | 10.4 | 9.5 | 7.2 |

### SOURCE OF CONTAGIUM OF DIPHTHERIA, AND HOW THE DISEASE IS SPREAD.

Of the 4,736 cases of diphtheria reported, during the year 1893, as exhibited in the following table, the local health officers reported the source of contagium as follows:—Traced to a former case, 550; due to contaminated water, 32; attributed to meteorological conditions, 38; attributed to unsanitary conditions, 102; unknown, 1,107; not reported or indefinitely reported, 2,907; total, 4,736.

TABLE 7.—*Reported Source of Contagium of Diphtheria in 1893.*

| | |
|---|---|
| Cases reported as traced to a former case | 550 |
| Cases reported due to contaminated water | 32 |
| Cases attributed to meteorological conditions | 38 |
| Cases attributed to unsanitary conditions | 102 |
| Cases the sources of contagium of which were reported as unknown (includes those reported "Contagium," "Sporadic," "Spontaneous," "De Novo," etc.) | 1,107 |
| Cases the sources of contagium of which were not reported, or the statements were too indefinite for classification | 2,907 |
| All cases | 4,736 |

### CASES TRACED TO A PRECEDING CASE.

Table 7, shows that of the 4,736 reported cases of diphtheria in the State in 1893, 550 were reported as traced to preceding cases of the disease. The following are extracts from a few of the reports in which health officers so reported:

Clarence S. Norton, health officer of Gustin township, Alcona county, in the final report of an outbreak of diphtheria in his jurisdiction, in which there were 9 cases and 2 deaths, stated that each case could be traced to a former case. All the cases occurred in one household. The house was placarded and family quarantined.

In an outbreak of diphtheria, in the city of Cheboygan, in which there were 21 cases and 3 deaths, the health officer, Dr. S. A. St. Amour, in his final report of the outbreak, states that the methods of restriction were carried out successfully, except in two houses, where 13 of the 21 cases occurred. Each of these 13 cases could be traced to a previous case.

Geo. L. LeFevre, M. D., health officer of Muskegon, in the final report of an outbreak of diphtheria in his jurisdiction, in which there were 52 cases and 7 deaths, gave the source of contagium as "Privy vaults, cesspools, and some coming in contact with others." He says, "About one-half were kept isolated," and "Some places where there were only two rooms, we could not keep them away from each other." He states that 35 of the cases in this outbreak could be traced to former cases.

### *Outbreaks Traced to Preceding Outbreaks.*

The following table (8) and Map, "Movement of Contagium of Diphtheria," show the sources and places to which diphtheria was spread in Michigan, where the contagium was reported by health officers to have been introduced into their jurisdictions from localities outside the State, or from other jurisdictions within the State.

TABLE 8.—*Exhibiting first, second and third Localities, where the second Locality was infected with Diphtheria from the first, and the third was infected from the second; and the numbers of Cases and Deaths from Diphtheria in the first, second and third Localities. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

| Number.‡ | First Localities from which Diphtheria spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. |
| 1 | Alcona county:<br>Curtis township | * | | Iosco county:<br>Oscoda village | 5 | 2 | Huron county:<br>Bingham township † | 8 | 2 |
| | | | | | | | Dwight township | 7 | 2 |
| | | | | | | | Huron township | 3 | 0 |
| | | | | | | | Paris township † | 42 | 16 |
| | | | | | | | Port Austin towns'p. | 8 | 0 |
| | | | | | | | Sanilac county:<br>Lexington township | 6 | 1 |
| 2 | Alcona county:<br>Millen township | 4 | 3 | Alcona county:<br>Gustin township | 28 | 14 | | | |
| | | | | Harrisville township | 30 | 11 | | | |
| | | | | Haynes township | 9 | 3 | | | |
| | | | | Mikado township | 1 | 0 | | | |
| | | | | Alpena county:<br>Maple Ridge township<br>(July 22–Dec. 11.) | 25 | 7 | Alpena county:<br>Alpena city †<br>(Aug. 8–Sept. 23.) | 5 | 2 |
| 3 | Allegan county:<br>Hopkins township<br>(Feb. 13–Mar. 9.) | 3 | 2 | Allegan county:<br>Monterey township<br>(June 13–July 13.) | 4 | 2 | | | |
| 4 | Barry county:<br>Castleton township | * | ---- | Barry county:<br>Hastings city | 7 | 3 | | | |
| | | | | Hastings township | 9 | 4 | | | |
| 5 | Bay county:<br>Bay City<br>(Jan. 7–Dec. 30.) | 705 | 100 | Bay county:<br>Hampton township<br>(Oct. 31–Feb. 18.) | 11 | 1 | | | |
| | | | | Pinconning village<br>(Sept. 14–Dec. ——.) | 6 | 1 | | | |
| | | | | Portsmouth towns'p.<br>(Aug. 9.) | 15 | 0 | | | |
| | | | | Ogemaw county:<br>Foster township<br>(July 27–Aug. 19.) | 4 | 0 | Genesee county:<br>Thetford township<br>(Feb. 24–Mar. 18.) | 3 | 1 |
| | | | | West Branch village<br>(Jan. 11–Feb. 15.) | 2 | 0 | Lapeer county:<br>Goodland township<br>(April 15–April 28.) | 4 | 2 |
| | | | | Saginaw county:<br>Saginaw City, W. S.<br>(Jan. 4–Dec. 28.) | 87 | 13 | Saginaw county.<br>Tittabawassee twp.<br>(June 3–June 14.) | 3 | 0 |
| | | | | Tuscola county:<br>Columbia township<br>(April 15 ——.) | 1 | 0 | Tuscola county:<br>Denmark township<br>(Mar. 7 ——) | 3 | 0 |
| 6 | Bay county | * | ---- | Tuscola county:<br>Gilford township | 8 | 7 | | | |
| 7 | Berrien county:<br>Benton Harbor city<br>(Jan. 7–April 4.) | 15 | 7 | Cass county:<br>Cassopolis village | 1 | 0 | | | |
| 8 | Berrien county:<br>Hagar township | * | ---- | Van Buren county:<br>Bangor village | 1 | 0 | | | |

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* Diphtheria was not reported to this Office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected, probably not reported to the health officer as the law provides.

† Spread to a fourth locality. See text p. 171.

‡ These consecutive numbers refer to corresponding consecutive numbers preceding paragraphs, further on, which state the details and the names of the health officers reporting the facts.

TABLE 8.—Continued.—*Movement of infection.*

| Number.‡ | First Localities from which Diphtheria spread. | | | Second Localities Infected from first. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. |
| 9 | Calhoun county:<br>Battle Creek city<br>(Jan. 7-Nov. 12.) | 13 | 0 | Barry county:<br>Prairieville township<br>(January.) | 2 | 0 | | | |
| 10 | Cheboygan county:<br>Cheboygan city | 25 | 10 | Cheboygan county:<br>Beaugrand township | 14 | 3 | | | |
| 11 | Clinton county:<br>Bath township | 4 | 1 | Ingham county:<br>Meridian township | 1 | 0 | | | |
| 12 | Clinton county:<br>Bengal township<br>(Mar. 1-Nov. 20.) | 14 | 4 | Clinton county:<br>Bingham township<br>(Oct. 12-Oct. 29.) | 4 | 0 | | | |
| | | | | St. Johns village<br>(Aug. 8-Aug. 25.) | 1 | 0 | | | |
| 13 | Crawford county:<br>Center Plain township<br>(Mar. 16-Mar. 20.) | 2 | 2 | Roscommon county:<br>Roscommon village<br>(Mar. 23-Dec. 23.) | 33 | 10 | Crawford county:<br>Center Plains towns'p<br>(Dec. — Jan. 1894.) | 6 | 3 |
| 14 | Genesee county:<br>Clayton township | * | ---- | Genesee county:<br>Flint township | 4 | 1 | | | |
| 15 | Grand Traverse county:<br>Fife Lake village<br>(Mar. 9-June 7.) | 8 | 2 | Kalkaska county:<br>Springfield township<br>(July 10-Aug. 18.) | 11 | 2 | G'd Traverse county:<br>Fife Lake township<br>(July 13-Sept. 6.) | 5 | 0 |
| 16 | Hillsdale county:<br>Hillsdale city | * | ---- | Branch county:<br>Ovid township | 3 | 1 | | | |
| 17 | Huron county:<br>Oliver township<br>(Jan. 11-Aug. 1.) | 35 | 10 | Huron county:<br>Mead township<br>(July 1-Nov. 15.) | 4 | 2 | | | |
| | | | | Winsor township<br>(Nov. 4-Nov. 16.) | 2 | 1 | | | |
| 18 | Ingham county:<br>Lansing city<br>(Jan. 1-Nov. 18) | 95 | 22 | Ingham county:<br>Onondaga township<br>(July 28-Aug. 1.) | 8 | 2 | | | |
| 19 | Ionia county:<br>Orleans township<br>(Jan. —.) | 3 | 1 | Montcalm county:<br>Greenville city<br>(Feb. 19-Mar. 17.) | 3 | 2 | | | |
| 20 | Iosco county:<br>Tawas township<br>(Sept. 8-Jan. 20.) | 9 | 3 | Iosco county:<br>Alabaster township<br>(Oct. 27-Nov.) | 3 | 0 | | | |
| 21 | Kalamazoo county:<br>Kalamazoo city<br>(Jan. 20-Dec. 16.) | 35 | 4 | Kalamazoo county:<br>Kalamazoo township<br>(Nov. 10-Nov. 20.) | 1 | 0 | | | |
| 22 | Kent county:<br>Grand Rapids city<br>(Jan. 1-Dec. 29.) | 209 | 41 | Barry county:<br>Woodland township<br>(Jan. 5-Jan. 20.) | 1 | 0 | | | |
| | | | | Kent county:<br>Ada township<br>(May 16-Sept. 1) | 9 | 2 | | | |
| | | | | Tyrone township<br>(June —.) | 1 | 0 | | | |
| | | | | Montcalm county:<br>Pierson township<br>(Jan. 16-June 10.) | 1 | 0 | | | |
| | | | | Ottawa county:<br>Wright township<br>(June 16-June 17.) | 1 | 1 | | | |

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* Diphtheria was not reported to this Office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected, probably not reported to the health officer as the law provides.

‡ These consecutive numbers refer to corresponding consecutive numbers preceding paragraphs, further on, which state the details and the names of the health officers reporting the facts.

TABLE 8.—CONTINUED.—*Movement of infection.*

| Number. | First Localities from which Diphtheria spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. |
| 23 | Kent county:<br>Lowell village | 56 | 9 | Kent county:<br>Bowne township | 1 | 1 | | | |
| 24 | Lenawee county:<br>Adrian city<br>(Jan. 28–Dec. 14.) | 26 | 6 | Livingston county:<br>Green Oak township.<br>(Aug. 9–Aug. 21.) | 1 | 0 | | | |
| 25 | Macomb county:<br>Mt. Clemens village | * | ---- | Macomb county:<br>Sterling township | 3 | 0 | | | |
| 26 | Macomb county:<br>Romeo village | * | ---- | St. Clair county:<br>Mussey township | 1 | 0 | | | |
| 27 | Manistee county:<br>Manistee city | 1 | 0 | Manistee county:<br>Bear Lake township | 3 | 0 | | | |
| 28 | Mason county:<br>Ludington city<br>(Jan. 4–July 14.) | 7 | 3 | Mason county:<br>Summit township<br>(Sept. 30–Oct. 20.) | 5 | 1 | | | |
| 29 | Menominee county:<br>Mellen township | 1 | 1 | Menominee county:<br>Ingallston township | 4 | 0 | | | |
| 30 | Montcalm county:<br>Winfield township<br>(Aug. 12–Sept. 26.) | 8 | 4 | Mecosta county:<br>Deerfield township<br>(Aug. 8–Sept. 28) | 6 | 2 | | | |
| 31 | Muskegon county:<br>Muskegon city<br>(May 16–Dec. 24.) | 76 | 12 | Ottawa county:<br>Coopersville village<br>(July 7–Aug. 28.) | 3 | 2 | | | |
| 32 | Oceana county:<br>Clay Bank township<br>(Sept. 8–Oct. 1.) | 2 | 0 | Oceana county:<br>Grant township<br>(Sept. 20–Oct. 5.) | 1 | 0 | | | |
| 33 | Otsego county:<br>Gaylord village<br>(May 7–June 18.) | 6 | 3 | Crawford county:<br>Grayling township<br>(May 10–May 25.) | 5 | 2 | Lapeer county:<br>Lapeer city | 2 | 1 |
| | | | | | | | Wexford county:<br>Selma township | 2 | 1 |
| | | | | Otsego county:<br>Corwith township<br>(June 4–Dec. 25.) | 14 | 2 | | | |
| | | | | Wexford county:<br>Cedar Creek township<br>(June 28–July 2.) | 1 | 1 | | | |
| 34 | Roscommon county:<br>Roscommon village<br>(Mar. 23–Dec. 23.) | 33 | 10 | Crawford county:<br>Ball township<br>(May 28–July 16.) | 2 | 1 | | | |
| 35 | Sanilac county:<br>Sanilac township | * | ---- | Sanilac county:<br>Marion township | 2 | 0 | | | |
| 36 | Shiawassee county:<br>Corunna city<br>(May 2–June—.) | 12 | 3 | Tuscola county:<br>Millington village<br>(May–June 15.) | 6 | 1 | Tuscola county:<br>Caro village<br>(May 6–June 10.) | 3 | 1 |
| 37 | Shiawassee county:<br>Owosso city<br>(Jan. 3–Dec. 15.) | 38 | 6 | Montcalm county:<br>Pine township<br>(Sept. 1–Sept. 30.) | 1 | 0 | | | |
| | | | | Saginaw county:<br>Chesaning village | 1 | 0 | | | |
| | | | | Shiawassee county:<br>Bennington township<br>(Mar. 28–Apr. 8.) | 1 | 0 | | | |
| | | | | Shiawassee township | 1 | 0 | | | |
| | | | | Vernon township<br>(June 1–June 15.) | 2 | 0 | | | |

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* Diphtheria was not reported to this Office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected, probably not reported to the health officer as the law provides.

TABLE 8.—CONTINUED.—*Movement of infection.*

| Number. | First Localities from which Diphtheria spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. |
| 38 | St. Clair county:<br>Fort Gratiot city | * | .... | St. Clair county:<br>Clay township | 3 | 1 | | | |
| 39 | St. Clair county:<br>Marine city<br>(Jan. 1-Dec. 8.) | 77 | 18 | St. Clair county:<br>Algonac village<br>(Nov. 26-Jan. 10.) | 6 | 1 | | | |
| | | | | China township<br>(Nov. 20-Jan. 13.) | 6 | 2 | | | |
| 40 | St. Clair county:<br>Port Huron city<br>(Jan.-Dec. —.) | 74 | 12 | Sanilac county:<br>Elk township<br>(May 4-May 8.) | 2 | 1 | | | |
| | | | | St. Clair county:<br>Kimball township<br>(July 1-Sept. 11.) | 2 | 0 | | | |
| 41 | Washtenaw county:<br>Milan village<br>(Apr. 15-May 15.) | 6 | 4 | Monroe county:<br>Milan township<br>(June 7-June.) | 6 | 1 | | | |
| 42 | Wayne County:<br>Detroit City<br>(Jan. 1-Dec. 31.) | 639 | 183 | Houghton county:<br>Franklin township<br>(Aug.) | 2 | 0 | | | |
| | | | | Ingham county:<br>Meridian township<br>(Jan. 13-Jan. 15.) | 1 | 1 | | | |
| | | | | Macomb county:<br>Erin township<br>(April 16-May 8.) | 4 | 3 | | | |
| | | | | Ray township<br>(Oct. 17-Oct. 27.) | 1 | 0 | | | |
| | | | | St. Clair county:<br>St. Clair city<br>(July 9-July 18.) | 4 | 1 | | | |
| | | | | Wayne county:<br>Dearborn village<br>(July 4-Aug. 13.) | 9 | 1 | | | |
| | | | | Plymouth village<br>(Oct. 12-Oct. —.) | 1 | 0 | Livingston county:<br>Fowlerville village | 1 | 0 |
| | | | | Romulus township<br>(Aug 19-Aug. 26.) | 1 | 1 | | | |
| 43 | Northern part of the State | .... | .... | Allegan county:<br>Plainwell village | 7 | 3 | Allegan county:<br>Otsego village | 2 | 1 |

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* Diphtheria was not reported to this Office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected, probably not reported to the health officer as the law provides.

TABLE 8.—CONTINUED.—*Movement of Infection* Into Michigan *from outside the State.*

| Number. | First Localities from which Diphtheria spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. |
| 44 | Atchison, Topeka and Santa Fé sleeping car | ---- | ---- | Berrien county: | | | | | |
| | | | | Three Oaks village | 4 | 2 | | | |
| 45 | Canada | ---- | --- | Genesee county: | | | | | |
| | | | | Davison township | 17 | 1 | | | |
| | | | | Shiawassee county: | | | | | |
| | | | | Fairfield township | 8 | 2 | | | |
| 46 | Chicago | ---- | ---- | Berrien county: | | | | | |
| | | | | Benton Harbor city | 1 | 0 | | | |
| | | | | Sodus township | 1 | 1 | | | |
| | | | | St. Joseph city | 1 | 0 | | | |
| | | | | Cass county: | | | | | |
| | | | | Cassopolis village | 5 | 3 | | | |
| | | | | Eaton county: | | | | | |
| | | | | Sunfield township | 2 | 1 | | | |
| | | | | Ionia county: | | | | | |
| | | | | Otisco township | 7 | 1 | | | |
| | | | | Kent county: | | | | | |
| | | | | Grattan township | 3 | 1 | | | |
| | | | | Menominee county: | | | | | |
| | | | | Stephenson township | 1 | 0 | | | |
| | | | | Oakland county: | | | | | |
| | | | | Milford township | 1 | 0 | | | |
| | | | | St. Joseph county: | | | | | |
| | | | | Burr Oak village | 4 | 2 | | | |
| 47 | Dakota | ---- | ---- | St. Joseph county: | | | | | |
| | | | | Park township | 4 | 0 | | | |
| 48 | Ohio: | | | Emmet county: | | | | | |
| | Cincinnati | ---- | ---- | Carp Lake township | 1 | 0 | | | |
| 49 | Ohio: | | | Monroe county: | | | | | |
| | Cleveland | ---- | ---- | Ida township | 7 | 0 | | | |
| 50 | Ohio: | | | Monroe county: | | | | | |
| | Toledo | ---- | ---- | Erie township | 1 | 0 | | | |
| | | | | Monroe city | 26 | 10 | | | |
| 51 | Wisconsin: | | | Chippewa county: | | | | | |
| | West Superior | ---- | ---- | Superior township | 1 | 0 | | | |

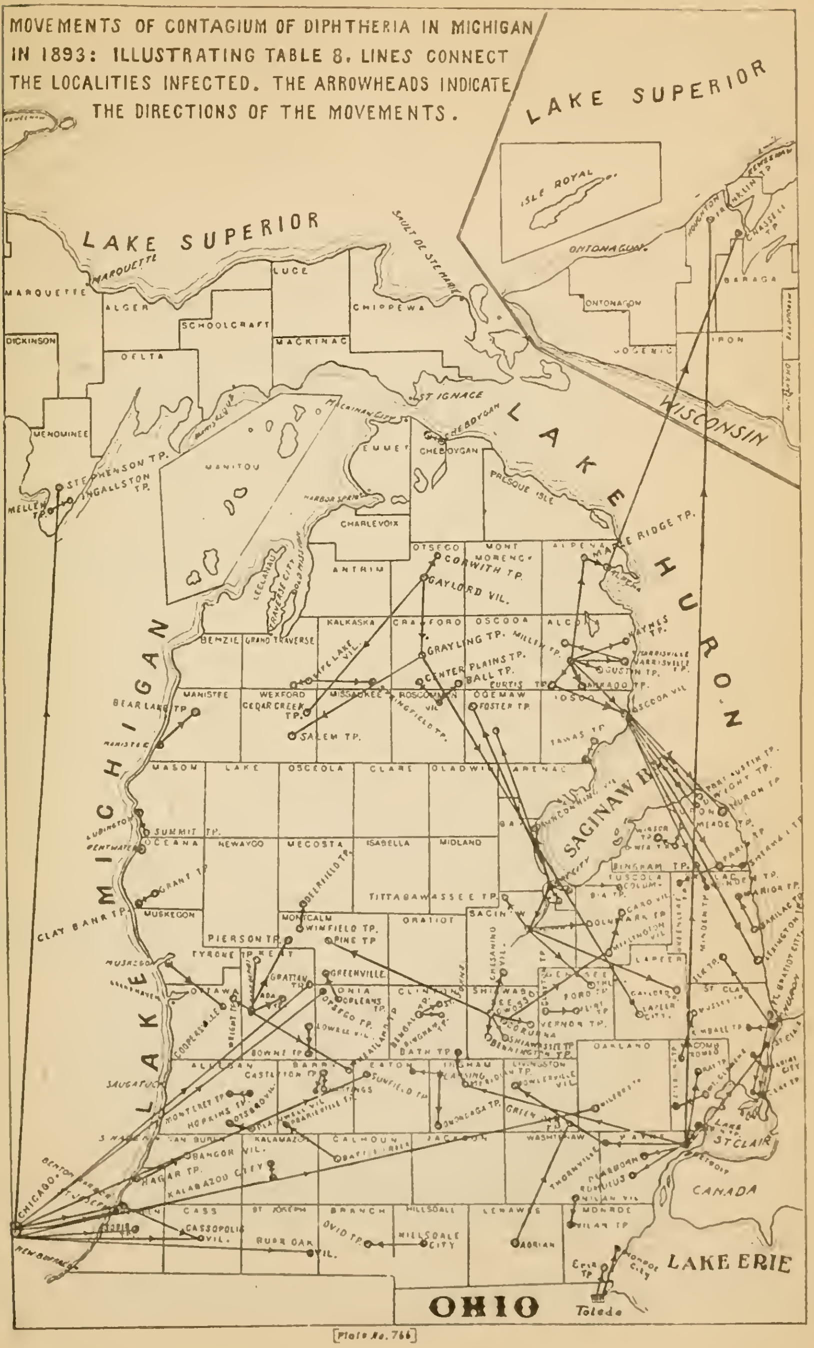
TABLE 8.—CONCLUDED.—**Probable** *Movement of Infection.*

| Number. | First Localities from which Diphtheria spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. | Localities. | Cases. | Deaths. |
| 52 | Alcona county:<br>Harrisville township<br>(May 17–Aug. 29.) | 30 | 11 | Alcona county:<br>Millen township<br>(Oct. 26.) | 4 | 3 | | | |
| 53 | Bay county:<br>Bay City<br>(Jan. 7–Dec. 30.) | 705 | 100 | Bay county:<br>Essexville village | 3 | 1 | | | |
| 54 | Hillsdale county:<br>Litchfield village | 6 | 1 | Hilsdale county:<br>Litchfield township | 8 | 2 | | | |
| 55 | Huron county:<br>Paris township<br>(June 16–Oct. 8.) | 42 | 16 | Huron county:<br>Sherman township<br>(Aug. —.) | 1 | 0 | | | |
| 56 | Ingham county:<br>Lansing city<br>(Jan. 1–Nov. —.) | 95 | 22 | Eaton county:<br>Oneida township<br>(May —.) | 1 | 0 | | | |
| 57 | Mecosta county:<br>Big Rapids city<br>(Oct. 11–Nov. 7.) | 3 | 1 | Branch county:<br>Girard township<br>(Nov. 9–Nov. 29.) | 2 | 1 | | | |

### MOVEMENTS OF DIPHTHERIA CONTAGIUM IN MICHIGAN IN 1893.

On the accompanying map, the spread of diphtheria in Michigan, in the year 1893, as reported to this office, is shown by black lines which connect the localities; the arrow-heads indicate the direction of the movement in each instance. The source of this information is given in the list of "extracts from reports of health officers" (beginning on page 168), with the name and address of each health officer who traced the source of contagium to some place outside of his jurisdiction. Tabular statements relating to these instances are in Table 8, page 161. Consecutive numbers in the first column of Table 8, preceding each "First locality" from which diphtheria spread, facilitate reference to corresponding consecutive numbers preceding paragraphs in the "extracts from reports of health officers" on pages 168-171.

MOVEMENTS OF CONTAGIUM OF DIPHTHERIA IN 1893.



[Plate No. 766]

The following are extracts from the reports of health officers who were able to trace the outbreaks of diphtheria in their respective jurisdictions, to outbreaks of the disease outside their jurisdictions,—with the name of the health officer, and of the jurisdiction, subjoined. These quotations concerning the spread of contagium from first to second, and even third localities, are arranged in the same order as the "First Localities" in Table 8, thus giving the source of each report. The map on page 167 graphically exhibits these movements of diphtheria contagium in the year 1893.

1. † "From Curtis township, Alcona county."—*E. C. Beem, M. D., Oscoda village, Iosco county.*

1. * "Exposure of the body of a person dead from diphtheria, which had been shipped from Oscoda village, Mich."—*J. S. Corcoran, M. D., Bingham township. Huron county.*

1. * "Brought in by a Polander, from Oscoda village, who was working in the lumber woods."—*R. J. May, M. D., Dwight township, Huron county.*

1. * "From Oscoda."—*W. J. Herrington, M. D., Huron township, Huron county.*

1. * "A dead body brought from Oscoda, Mich., from a camp in the woods, and a patient who came from same camp at same time."—*Lewis Kucharczyk, Paris township, Huron county.*

1. * "From Oscoda."—*Willet J. Herrington, M. D., Port Austin township, Huron county.*

1. * "Body brought from Oscoda; had a public funeral."—*Walter P. Brown, M. D., Lexington township, Sanilac county.*

2. "From Camp 8, Millen township [Alcona county]."—*C. S. Norton, M. D., Gustin township, Alcona county.*

2. "From Camp [8] in the neighborhood."—*D. W. Mitchel, M. D., Harrisville township, Alcona county.*

2. "Brought from Loud and Sons' Camp No. 8."—*Robert Dobson, Haynes township, Alcona county.*

2. "The boy was working at Camp 8, a lumber camp in the township of Millen, Alcona county, and came home sick."—*Wm. C. Shepard, Mikado township, Alcona county.*

2. "Brooks' Camp, on the new railroad (Alpena and Northwestern), supposed to have been brought there by a man from Loud's Camp No. 8."—*J. J. Cathro, Maple Ridge township, Alpena county.*

2. * "From Maple Ridge township."—*Arthur Wilkinson, M. D., Alpena, Alpena county.*

3. "Supposed to be brought into the township from the township of Hopkins."—*Myron A. Powell, Monterey township. Allegan county.*

4. ‡ "Mrs. A.——, moved from Morgan [Castleton township], Barry county, bringing her child's clothing, who had died of diphtheria a few weeks before she moved into S——'s house. She did not disinfect house or clothing."—*Geo. W. Lowry, M. D., Hastings city, Barry county.*

4. "From the Ashton case."— *Wallace Hobbs, Hastings township, Barry county.*

5. "From Bay City."—*H. J. Garber, M. D., Hampton township. Bay county.*

5. "First case from Bay City."—*W. B. Abbott, M. D., Pinconning village, Bay county.*

5. "Bay City."—*Geo. Wainwright, Portsmouth township, Bay county.*

5. "Family came to this township on a visit, from Bay City, where diphtheria had been running for some time, as the neighbors of this family had lost two or three children."—*C. J. Phelps, Foster township, Ogemaw county.*

5. "From Bay City."—*C. L. Nauman, M. D., West Branch village, Ogemaw county.*

5. "Bay City."—*S. E. Campbell, M. D., Saginaw, W. S., Saginaw county.*

5. * "As near as I can learn, through carpet-rags, brought from a distant town [Saginaw] to this house to be made into carpet."—*Abram H. Coddington, Thetford township, Genesee county.*

5. * "From a person from Saginaw who had a sore throat."—*Samuel McKiller, Goodland township, Lapeer county.*

5. * "Diphtheria was introduced into the township of Tittabawassee by John Trumbell, who was sent from Saginaw."—*Wm. H. Metcalf, Tittabawassee township, Saginaw county.*

5. * "From Saginaw."—*Geo. Reid, M. D., Denmark township, Tuscola county.*

5. "The child was exposed to the contagium in Bay City, where she was visiting."—*W. C. Wright, M. D., Columbia township, Tuscola county.*

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* Third locality.

† These consecutive numbers preceding paragraphs refer to corresponding consecutive numbers in first column of Table 8.

‡ Instance where the contagium was carried by persons, who were not themselves affected (probably in their clothing).

6. "The young man first taken had been working in Bay county and contracted the disease there."—*Joseph F. Malbury, Gilford township, Tuscola county.*

7. "The child sick with diphtheria came to the village on a visit, from Benton Harbor, and was taken sick very soon after her arrival in this place."—*Thos. W. Anderson, M. D., Cassopolis village, Cass county.*

8. "Hagar township, Berrien county."—*Mrs. Lu C. Harrison, M. D.. Bangor village, Van Buren county.*

9. "By a girl coming from Battle Creek into Mr. Thomb's house visiting."—*G. R. Hyde, M. D., Prairieville township, Barry county.*

10. "By a family that had diphtheria moving from Cheboygan city. Their clothing had never been disinfected after their recovery."—*Daniel Nelligan, Beaugrand township, Cheboygan county.*

11. "Bath township, Clinton county."—*J. B. Park, M. D., Meridian township, Ingham county.*

12. "Patient had been taking care of other patients, who were sick with the disease in another jurisdiction [Bengal township], and came down with it in my jurisdiction."—*Henry Palmer, M. D., Bingham township, Clinton county.*

12. "Came in contact with cases, or from being in house where there were cases of diphtheria last spring in the township of Bengal, Clinton county."—*John B. Dodge, M. D., St. Johns village, Clinton county.*

13. "Directly from fatal cases at Cheney (Crawford county)."—*Jas. A. Fraser, M. D., Roscommon village, Roscommon county.*

13. *"It was brought from Roscommon."—*F. P. Richardson, Center Plains township, Crawford county.*

14. "It was brought from the township of Clayton by another girl."—*Thos. H. Nesbitt, Flint township, Genesee county.*

15. "By Wm. D—— [of Fife Lake village, Gd. Traverse county], carried in hair. He washed person, except head, in zinc solution. Clothes were disinfected by the health officer."—*G. D. Gardner, Springfield township, Kalkaska county.*

15. *"From a case occurring in the township of Springfield, Kalkaska county."—*L. S. Walter, M. D., Fife Lake township, Grand Traverse county.*

16. "City of Hillsdale."—*Wm. F. Bingham, Ovid township, Branch county.*

17. "Epidemic in Elkton (Oliver township)."—*Ford W. Sellars, M. D., Mead township, Huron county.*

17. "Patient went to Elkton (township of Oliver), and slept where disease had been."—*Otto Frenzel, M. D., Winsor township, Huron county.*

18. "It came from the city of Lansing by the return of a young man who contracted it there."—*F. D. Woodworth, M. D., Onondaga township, Ingham county.*

19. "From Orleans township [Ionia county]."—*C. O. Jenison, M. D., Greenville city, Montcalm county.*

20. "Supposed to have come from Tawas township, a distance of about one and one-half miles."—*Benj. F. Slingerland, Alabaster township, Iosco county.*

21. "Kalamazoo city."—*O. B. Ranney, M. D., Kalamazoo township, Kalamazoo county.*

22. "It was contracted at Grand Rapids, Mich."—*John A. Baughman, M. D., Woodland township, Barry county.*

22. "Presumably from Grand Rapids."—*L. F. VanAmburg, M. D., Ada township, Kent county.*

22. "Supposed to have been brought from the city of Grand Rapids."—*Hugh J. Kelly, clerk Tyrone township, Kent county.*

22. "Sent here from Grand Rapids."—*J. R. DeWolf, Pierson township, Montcalm county.*

22. "Child went to Grand Rapids on the 16th of June, came down with disease on the 17th."—*Chas. E. Chappell, M. D.. Wright township, Ottawa county.*

23. "In Lowell village."—*J. E. Hunter, M. D., Bowne township, Kent county.*

24. "The patient was brought here from Adrian, to the military encampment Aug. 9, and was sick on arrival, or very soon after, with supposed tonsillitis which soon developed into diphtheria."—*Robert W. Olds, Green Oak township, Livingston county.*

25. "Brought from Mt. Clemens."—*Ira G. Chapman, Sterling township, Macomb county.*

26. "A young man working near Romeo, came home supposing he had the grippe, had a sore throat no doubt diphtheria."—*Jas. R. McGurk, M. D., Mussey township, St. Clair county.*

27. "Visitor from Manistee."—*Geo. W. McKnight, Bear Lake township, Manistee county.*

28. "Supposed to have come from Ludington."—*John C. Cribbs, Summit township, Mason county.*

29. "Mellen township."—*S. C. Hayward, Ingallston township, Menominee county.*

30. "Township of Winfield, Montcalm county."—*Daniel Borland, Deerfield township, Mecosta county.*

31. "From a case brought here for burial from Muskegon, and the friends of the deceased going to Mr. Chas. De Shone's after the burial."—*F. D. Smith, M. D., Coopersville village, Ottawa county.*

32. "From Clay Bank township."—*Edward S. Randall, Grant township, Oceana county.*

33. "From Gaylord."—*C. W. Smith, M. D., Grayling township, Crawford county.*

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* Third locality.

33. *"Two young men came on train from Grayling, Crawford county. One of them was evidently affected before leaving."—*Wm. Blake, M. D., Lapeer city, Lapeer county.*

33. *"From Grayling township, Crawford county."—*Frank L. Goodyear, Selma township, Wexford county.*

33. "From Gaylord."—*Abraham VanAuken, Corwith township, Otsego county.*

33. "A sister had the disease at Gaylord and came home, I think, either too soon, or else her clothing was not sufficiently fumigated."—*V. F. Huntley, M. D., Cedar Creek township, Wexford county.*

34. "From Roscommon (village)."—*Wilson Hickey, Ball township, Crawford county.*

35. "Brought from Sanilac township, convalescent."—*G. C. Vincent, M. D., Marion township, Sanilac county.*

36. "Brought by children from Corunna."—*H. A. Bishop, M. D., Millington village, Tuscola county.*

36. *"From Millington village."—*D. S. Stevens, M. D., Caro village, Tuscola county.*

37. "Owosso."—*C. C. Sayler, M. D., Pine township, Montcalm county.*

37. "From Owosso."—*D. W. Mudge, M. D., Chesaning village, Saginaw county.*

37. "Supposed to be from Owosso."—*Chas. Shickler, M. D., Bennington township, Shiawassee county.*

37. "Patient's people (of first patient sick) visited in Owosso, at the house a few days previous to outbreak of diphtheria, I think it came from that source."—*F. S. Love, M. D., Vernon township, Shiawassee county.*

38. "Family visited at Fort Gratiot remaining a week in a family where diphtheria was present."—*Wm. K. Moore, M. D., Clay township, St. Clair county.*

39. "From Marine City."—*Wm. K. Moore, M. D., Algonac village, St. Clair county.*

39. "Bringing a child infected with the disease from Marine City, into their family."—*Henry Diem, China township, St. Clair county.*

40. "Contracted in Port Huron."—*L. E. Cochran, M. D., Elk township, Sanilac county.*

40. "From Port Huron city."—*Geo. C. Brock, M. D., Kimball township, St. Clair county.*

41. "From the village of Milan."—*Moses J. Howe, Milan township, Monroe county.*

42. "From Detroit."—*J. M. Rhodes, M. D., Franklin township, Houghton county.*

42. "Mc C——, visited his daughter in Detroit, sick with diphtheria, contracted the disease."—*J. B. Park, M. D., Meridian township, Ingham county.*

42. "Probably city of Detroit."—*Jas. Yates, M. D., Erin township, Macomb county.*

42. "Supposed to have been exposed in Detroit while on a visit to a relative."—*Geo. B. Court, Ray township, Macomb county.*

42. "A relative from Detroit who had had diphtheria was visiting here, and must have brought it in his clothes."—*Wm. E. Burtless, M. D, St. Clair city, St. Clair county.*

42. "Came from Detroit."—*Theo. V. Law, M. D., Dearborn village, Wayne county.*

42. "By contagium in Detroit."—*J. M. Collier, M. D., Plymouth village, Wayne county.*

42. *"Was brought from Plymouth, Mich."—*Byron Defendorf, M. D., Fowlerville village, Livingston county.*

42. "Boy was exposed in Detroit."—*David W. Wood, Romulus township, Wayne county.*

43. "It seemed to come from the northern part of the State, through a man by the name of C. G.——, and from him to his children, then to the school."—*C. M. Stuck, M. D., Plainwell village, Allegan county.*

43. *"From the house of a family, one G——, living in Plainwell, Mich."—*Milton Chase, M. D., Otsego village, Allegan county.*

## *Outbreaks in Michigan Traced to Preceding Cases Outside of the State.*

44. "From Atchison, Topeka and Santa Fe sleeping cars."—*H. B. Wilcox, M. D., Three Oaks village, Berrien county.*

45. "The first case was brought home sick, from Canada."—*Jas. F. Rumer, M. D., Davison township, Genesee county.*

45. "A neighbor's wife visited in Canada, there had the disease. Her husband went to attend her, and took the disease. After they were pronounced cured they came home; three weeks later, M——, a near neighbor, took the disease."—*Andrew VanDeusen, Fairfield township, Shiawassee county.*

46. "Chicago."—*Wakeman Ryno, M. D., Benton Habor city, Berrien county.*

46. "The disease was introduced by the unpacking of clothes of a child that had died in Chicago about one year ago."—*C. C. Bell, Sodus township, Berrien county.*

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* Third locality.

46. "Patient was sick with the disease when he arrived in this city from Chicago."—*Jno. W. Doyle, M. D., St. Joseph city, Berrien county.*

46. "Chicago."—*Thos. W. Anderson, M. D., Cassopolis village, Cass county.*

46. "Chicago."—*E. M. Snyder, M. D., Sunfield township, Eaton county.*

46. "Chicago."—*Wm. Bell, M. D., Otisco township, Ionia county.*

46. "The first case supposed to have been contracted while attending the fair at Chicago."—*G. W. Spencer, M. D., Grattan township, Kent county.*

46. "Brought from Chicago."—*Edward Sawbridge, M. D., Stephenson township, Menominee county.*

46. "From Chicago, Illinois, to Milford township, Oakland Co., Mich."—*Henry B. Hemenway, M. D., Evanston, Illinois.*

46. "Disease contracted while in Chicago, probably on fair grounds."—*C. D. Parsons, M. D., Burr Oak village, St. Joseph county.*

47. "By a family from Dakota (visiting parents at this place) who had recovered from the disease above mentioned some three months prior to their coming."—*J. G. K. Ayers, M. D., Park township, St. Joseph county.*

48. "From Cincinnati, Ohio."—*D. Walford, Carp Lake township, Emmet county.*

49. "Imported from Cleveland."—*C. C. Iffland, M. D., Ida township, Monroe county.*

50. "Toledo, Ohio."—*K. K. Harrison, M. D., Erie township, Monroe county.*

50. "Toledo, Ohio."—*Geo. F. Heath, M. D., Monroe city, Monroe county.*

51. "From West Superior, Wis."—*E. H. Webster, M. D., Superior township, Chippewa county.*

## *Outbreaks Probably Traced to Former Outbreaks.*

52. "Probably from West Harrisville, where the disease has been prevalent during the past summer."—*William Parr, M. D., Millen township, Alcona county.*

53. "Don't know. Probably spread from Bay City jurisdiction."—*O. A. Lloyd, Essexville village, Bay county.*

54. "Supposed (by contagium) from cases in Litchfield village."—*L. A. Howard, M. D., Litchfield township, Hillsdale county.*

55. "Source of contagium unknown only so far that diphtheria was in the next township [Paris]."—*P. O. Wagener, M. D., Sherman township, Huron county.*

56. "They did not know. Thought it was from Lansing."—*J. W. Ewing, Oneida township, Eaton county.*

57. "Could not ascertain positively as to the mode of introduction. The first case had come here from Big Rapids five weeks previous to his sickness."—*Jas. E. Perry, Girard township, Branch county.*

## *Diphtheria Carried to Fourth Localities.*

In the year 1893, there were four instances reported to this Office in which diphtheria was traced from the third to the fourth locality. (See Table 8, page 161.)

Below are given the third and fourth localities, the dates of occurrence of the outbreaks, and the numbers of cases and deaths in each instance.

| Third Localities. | Cases. | Deaths. | Fourth Localities. | Cases. | Deaths. | Third Localities. | Cases. | Deaths. | Fourth Localities. | Cases. | Deaths. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Alpena county:*<br>Alpena City<br>(Aug. 8-Sept. 23.) | 5 | 2 | *Houghton county:*<br>Chassell twp.<br>(Sept. 10 —.) | 1 | 0 | *Huron county:*<br>Paris twp.<br>(June 6-Oct. 8.) | 42 | 17 | *Huron county:*<br>Sherman twp.<br>(Aug. 1 —.) | 1 | 0 |
| *Huron county:*<br>Bingham twp.<br>(June 6-Aug. 14.) | 8 | 2 | *Sanilac county:*<br>Minden twp.<br>(June 18-Sept. 7.) | 7 | 4 |  |  |  | *Sanilac county:*<br>Greenleaf twp.<br>(July.) | 1 | 0 |

The following quotations are made from the reports of health officers who were able to trace outbreaks of diphtheria in their jurisdictions from localities which were known to be third localities in order of infection.

"Brought from Alpena by patient herself. Was taken sick in a day after coming here."—*R. R. Smith, M.D., Chassell township, Houghton county.*

"By being exposed to it by a relative living in [Bingham Tp.], Huron county."—*R. G. Healy, M. D., Minden township, Sanilac county.*

"Diphtheria was in the next township [Paris]."—*P. O. Wagener. M. D., Sherman township, Huron county.*

"Came from Paris township, Huron county."—*Albert Wickware, Greenleaf township, Sanilac county.*

### *Outbreaks Traced to Cases of "Sore Throat."*

The following reports of health officers show how diphtheria is frequently spread under that fear-allaying title, "sore throat" :--

"From a person from Saginaw who had a sore throat."—*Samuel McKiller, Goodland township, Lapeer county.*

"It commenced with quinsy in part of family and finally worked into diphtheria of a mild form."—*Geo. B. Court, Ray township, Macomb county.*

"From cases called tonsillitis."—*Mrs. C. M. Barnes, M. D., Fairplains township, Montcalm county.*

"From sore throat."—*Lester R. Cobb, M. D., Van Buren township, Wayne county.*

T. W. Anderson, M. D., health officer of Cassopolis village, Cass county, in a report to this office, made the following statement regarding the source of contagium of an outbreak of diphtheria in his jurisdiction, in which there were five cases and three deaths:—

"Mrs. P.——, mother of the children sick and deceased from diphtheria, went to Chicago, * * * and returned with a sore throat, which was quite severe, and made her quite ill shortly before diphtheria appeared in her family. It was not recognized as diphtheria and consequently not reported, and is the one case of diphtheria marked 'not reported' in this report."

Jas. D. Campbell, M. D., health officer of Hopkins township, Allegan county, in making the final report of an outbreak of diphtheria in his jurisdiction, in which there was one fatal case, stated as follows relative to the source of the outbreak:—

"We had only one case (died). The facts are that a neighboring family had been having what they called tonsillitis. I believe this child had been over to see them during their throat trouble. I had their house thoroughly disinfected as soon as I learned the facts, and no further cases were reported."

### *Outbreaks of Diphtheria Attributed to Unsanitary Conditions.*

The following are some representative statements of health officers (or clerks) who attributed outbreaks of diphtheria in their jurisdictions to unsanitary conditions, with the name of the health officer and of his jurisdiction subjoined:—

"From filth of bad water."—*Wm. C. Shepard, Mikado township, Alcona county.*

"An old dilapidated building, musty and decaying. Privy and surroundings not in a good sanitary condition."—*Jno. D. Greenamyer, M. D., Niles township, Berrien county.*

"Low, marshy land and stagnant water."—*Malcolm McDonald, Brookfield township, Huron county.*

"Decaying vegetables in the cellar."—*Marvin W. Moore, Grant township, Huron county.*

"Dirty surroundings."—*Wm. H. Deady, M. D., Verona township, Huron county.*

"Caused by filthy conditions of house and premises."—*A. M. Martin, M. D., Odessa township, Ionia county.*

"Damp walls, in a new building, were the only cause to be found."—*L. N. Tuttle, M. D., Otisco township, Ionia county*

"Bad sanitary conditions; living in a small, poorly ventilated house, and bad drainage."—*R. M. Eccles, M. D., Blissfield township, Lenawee county.*

"From privy-vaults, cess-pools and some coming in contact with others."—*Geo. L. LeFevre, M. D., Muskegon city, Muskegon county.*

"Diphtheria had been in the family several years ago. House and yard very dirty. No drainage. Spring rains rendered surroundings absolutely filthy. This was undoubtedly the cause of the disease, as the child first taken had not been away from home for six weeks."—*Jas. W. Anderson, M. D., Troy township, Oakland county.*

"Bad water and filth were undoubtedly the cause of the outbreak."—*Hubert Pelgrim, Oliver township, Ottawa county.*

## HOW DIPHTHERIA IS SPREAD,—TRANSGRESSIONS OF PUBLIC HEALTH LAWS.

Frequently reports reach this office of persons infected with the contagium of diphtheria being permitted, in violation of the health laws of the State, to go from one family to another, to go upon the public streets, or to public or social gatherings, to go from one jurisdiction to another, and to travel upon the railroads, etc. To these transgressions of the laws, we can ascribe a large percentage of the outbreaks of this disease in our State. In some instances health officers fail to thoroughly isolate patients or to disinfect their rooms and clothing, thereby allowing the germs of the disease to remain, to cause other outbreaks at some future time; others allow public funerals, or the bodies of decedents from diphtheria to be conveyed from one point to another, scattering the contagium of the disease to innocent persons.

Other lamentable facts in regard to this subject are, that the proper authorities sometimes fail to comply with the law which provides for the appointment of health officers in their jurisdictions; and that physicians and householders transgress the law by neglecting to report to their health officers, cases of communicable diseases which come to their knowledge, or occur in their houses; and that householders fail to coöperate with health officers in their efforts to restrict communicable diseases; and even resist their attempts to stamp out those diseases by the performance of duties prescribed to them by law.

The following are extracts from letters and reports received at this Office, bearing on this subject:—

John L. Elliott, M. D., health officer of Bay City, stated in his annual report to this Office that the 705 cases and 100 deaths from diphtheria which had occurred in that city during the year 1893, had resulted from "imperfect quarantine and disinfection."

In a final report relative to an outbreak of diphtheria in his jurisdiction in which there were four cases and three deaths, P. J. McGrath, health officer of Monitor township, Bay county, made the following statement: "His two older children were at his father's, three miles away, sick with diphtheria, and by his visiting them he brought the disease home to his younger children."

Relative to an outbreak of diphtheria in the city of Saginaw, W. S., in which there were 16 cases and five deaths, the health officer, Dr. S. E. Campbell, made the following statement: "Where more than one person was sick in same house, the first was sick some days before the disease was diagnosed or reported."

Relative to an outbreak of diphtheria which occurred in Oliver township, Huron county, and in which there were 35 cases and 10 deaths, Otto Frenzel, M. D., health officer of the adjoining township of Winsor, in a letter to this Office, made the following statements:—

"I herewith enclose you a blank filled out to the best of my knowledge for the township of Oliver. Perhaps the cases have been reported to you heretofore. However, in my judgment, it appears as if they are not strict enough in their quarantine. I was informed this morning that there were 8 cases of diphtheria, all of which being within a radius of 20 rods of R. R. station, and they were all let out this morning to go at large, although there were 3 deaths yesterday among these several families.

"I am health officer for the township of Winsor, and the danger is very *great* that it will spread into my jurisdiction, and it is for that reason that I send you this communication."

An outbreak of diphtheria in Roscommon village, which lasted from Mar. 23 to Dec. 23, 1893, in which there were 33 cases and 10 deaths, was evidently due to neglect in not isolating patients having the disease, and in not disinfecting the homes of persons affected.

The correspondence which passed between the Secretary of this Board and the health authorities of Roscommon, relative to this outbreak, was quite extensive. On June 13, 1893, W. W. Vaughan, president of the village, telegraphed to this Office as follows:

"H. B. Baker, Sec'y—Send physician today [to] determine prevalent disease."

Dr. J. W. Hauxhurst, was recommended by the Secretary to determine the nature of this disease. The following is a copy of a hėktographed letter sent out from this Office, which includes Dr. Hauxhurst's report of his investigation:

### *The Deaths at Roscommon were Caused by Diphtheria.*

On the recommendation of Secretary Baker, of the State Board of Health, Dr. John W. Hauxhurst, of West Bay City, was called by W. W. Vaughan, President of the village of Roscommon, to determine the nature of a disease there, pronounced by some physicians tonsillitis, but by others diphtheria, and from which numerous cases of sickness, and at least five deaths have already occurred. Dr. Hauxhurst finds that the disease is diphtheria. The following is his report to the State Board of Health:—

"*West Bay City, Mich., June 16, 1893.*

"*Doctor H. B. Baker, Secretary State Board of Health, Lansing, Mich.:*

DEAR DOCTOR—Herewith I have the honor to report to you upon my investigation of an epidemic, which has existed for some weeks at Roscommon, the nature of which has been in dispute between the physicians of the place, and its mortality, in proportion to the number of cases occurring, dreadful enough to alarm the citizens generally, and thus lead to a call upon your office to settle the doubt in naming the disease, and assist in arresting its consequent danger to the public.

"My visit occurred on June 14, in response to a telegram from W. W. Vaughan, President of the village.

"The history of its appearance and spread in Roscommon is as follows:—

"On or about March 23, a young man by the name of Vein, from Houghton Lake, came into the drug store and asked for medicine for sore throat. The druggist referred him to Dr. Fraser, whose office is in the rear of the store, for examination and prescription. The symptoms presented aroused the doctor's suspicions that the man was afflicted with diphtheria, although no clearly organized membrane could be seen in the throat. He at once reported the occurrence to the village president, and also to the health officer [Dr. J. H. Curnalia], who practices medicine, urging the necessity for placing the man under quarantine, until doubt could be removed by further development of the disease. The health officer saw the man, and named his trouble sore throat from a cold, or at least nothing dangerous to the public, and did not place him under restraint. He died about March 30, and a public funeral was held, at which nearly all the Vein family were present. One week later a brother came down with the disease, and during his sickness another brother still, both of whom died. A married sister, living at Houghton Lake, who also attended the funeral, was attacked and died, and her death was followed by that of her infant child, from the same disease, leaving only two children of this family unattacked, and they were not exposed to the contagion.

"The father and mother of the Vein family were subsequently stricken, both recovering, as reported.

"On April 28, a Miss Hiscock was taken sick with the disease, and about the same time also a young man by the name of Scott. The former was in communication with the Vein family, during its prevalence among them, but the source of the Scott case could not be clearly and definitely traced. Both these cases recovered.

"A Mrs. Cox, the lady with whom Miss Hiscock staid while sick, slept at a Mrs. Holland's, with Miss Mulverhill, and one week later Miss Mulverhill came down with diphtheria. She is now ill, and is the case I was asked to see with Dr. Fraser, for the purpose of rendering my decision as to the nature of the disease, and thereby settle the point in dispute, in so far as the action of the village council was concerned, in protecting the public against contagion.

"Inspection of the throat showed both tonsils and the uvula covered with the dense membrane, the right side particularly presenting the complaint in a most typical form.

"From my conversation with the health officer, I am convinced that at least some of the cases, if not all of them he treated were well marked diphtheria.

"From one of them he obtained a cast membrane of the trachea, and which he had preserved and shown to several people of the town.

"He consented to let Dr. Fraser and myself see it if we would call at his home, but when we arrived there he claimed he could not find it.

"He said the patient from whom it came had been afflicted with simple acute bronchitis, and maintained that it is common to get such casts in this disease.

"Of course such statement from a health officer furnishes an inference too apparent to any physician who has dealt intelligently with diphtheria, and perhaps no better illustration than this outbreak can be offered to show the necessity of appointing *qualified* physicians,to perform the duties of health officers.

"Several cases of diphtheria, followed by death, occurred in Grayling, whose source was traceable directly to contact with the Vein family, and two malignant cases are now under treatment twelve miles from Roscommon, who contracted the disease from patients in the village.

"If Dr. Fraser's prompt and cautious efforts to guard the public safety had been observed, and that first case secluded beyond necessary attendants, to say nothing of the use of proper disinfection in the premises, the exigency for demanding a representative of your Board at Roscommon may not have existed.

"I am yours very truly,

"J. W. Hauxhurst.

"Now that the disease is known to be diphtheria it is expected that it will be promptly stamped out.

"Office of the Secretary, State Board of Health, Lansing, July 1, 1893."

I. A. Fraser, M. D., the newly appointed health officer of the village, in his final report of the outbreak, states that "In 3 or 4 of the cases, owing to no report being made, * * * isolation was not accomplished for several days after the outbreak; but eventually all were quarantined."

## *Alleged Neglect in an Outbreak of Diphtheria in Metz Township, Presque Isle County.*

In an outbreak of diphtheria in Metz township, Presque Isle county, which lasted from Aug. 8 to Dec. 20, 1893, and in which there were 34 cases and 14 deaths, it was alleged that the spread of the disease was due to neglect on the part of the health authorities of Metz township. The correspondence which passed between this office, the health authorities of Metz township, and the health officer of the city of Alpena is given below.

August 22, 1893, Arthur Wilkinson, M. D., health officer of Alpena, wrote to the Secretary of this Board relative to the above-mentioned outbreak, as follows:—

"It is reported in this city that diphtheria has made its appearance in the township of Metz, Presque Isle county. One man died and was buried this morning. Had been working in R. R. Camps.

"Our board, in conjunction with the Board of Health of Maple Ridge township, has sent a physician and one member, to be accompanied by the chairman of the Board of Health of Maple Ridge township, with instructions to investigate thoroughly all reports relating to diphtheria in the R. R. camps, and if this committee finds diphtheria in these camps, to use whatever means they deem best to prevent the spread."

Dr. Wilkinson telegraphed to the Secretary of this Board on August 24, 1893, as follows:—

"Come to Alpena immediately. Diphtheria epidemic in Presque Isle county."

The Secretary was absent from the Office when this telegram was received, but the following reply was made, by the clerk in charge:—

"I can't go, but recommend that you telegraph Dr. J. W. Hauxhurst, West Bay City."

On the return of the Secretary, Aug. 25, 1895, the following reply was made, to Dr. Wilkinson's letter:—

"DEAR DOCTOR:—Your letter of Aug. 22, was received and acknowledged here yesterday by a clerk, as was also your telegram, in my absence.

"My duties here are such that it is impossible for me to personally investigate any outbreak of diphtheria in any part of the State. The law contemplates that outbreaks of diphtheria are to be controlled by local boards of health; and the State Board aids by supplying pamphlets of explicit directions how to restrict the disease. If the pamphlets are distributed to the neighbors of those sick, the neighbors are more ready to coöperate with the local officers. If the local officers do their duties under the law, *the disease will be restricted.*

"There was not enough evidence of general danger around the State, in your letter and telegram, to warrant an investigation by the State Board of Health, especially as your letter shows that, as health officer of Alpena, you are alive to the situation. Alpena seems most endangered.

"My clerk telegraphed you, recommending Dr. Hauxhurst, of West Bay City, but I presume you considered that you could make the investigation yourself.

"I shall be glad to be kept informed of the progress or decline of the epidemic, and if it is necessary on behalf of the State to order an investigation, that will be done. It seems to be a case where prompt action by the local officials is needed."

On receipt of Dr. Wilkinson's letter of Aug. 22, pamphlets giving the best methods for restricting the spread of diphtheria, were sent to Herman Grambau, clerk of Metz township, with a letter urging that they be distributed among the neighbors of families having the disease.

Mr. Grambau, made a report to this Office, Aug. 24, 1893, in which he stated that, Paul Klavicoski, about 16 years old, was taken sick with diphtheria on the tenth day of August; that 9 cases of the disease had occurred in his jurisdiction.

Aug. 26, 1893, the Secretary wrote to Herman Grambau, as follows:—

"DEAR SIR:—I am informed that a serious outbreak of diphtheria has occurred in Metz township. It is alleged that no efforts at restriction are being made by your local board of health, of which you are the clerk. It is also alleged that the source of the contagium of the disease is a railroad camp located within your township.

"Will you have the kindness to inform me by return mail just what is being done to restrict the spread of the disease?"

Mr. Grambau replied to the above letter, Aug. 29, 1893, as follows:—

"Your communication and pamphlets, received; in reply will say that we are doing all we can to eradicate the disease from our midst. We have employed Dr. A. L. Seaman, of Alpena, to attend to those afflicted with the disease. After visiting them Dr. Seaman reported 15 cases of diphtheria, and two doubtful cases. Of those 15 cases, 7 have fully recovered.

"The disease is now wholly confined to the northern part of the township. We hope by energetic means, to get rid of it in a short time. Any communication that you make in the nature of inquiry, to Dr. Seaman or myself will be duly answered, at once."

The Detroit Tribune of Aug. 25, 1893, contained the following item:

"ALPENA, Mich., Special Telegram, Aug. 24.—Diphtheria is epidemic in Metz Township, Presque Isle County. Dr. Bell, Alpena's health officer, arrived from there this morning and reports eleven cases. There have also been eight deaths. In one house two corpses were lying uncoffined, with three children sick in the house. The people pay little attention to the disease, and many have been exposed. Alpena has been quarantined against that township by placing an officer on each road to prevent residents coming into town. The state board of health has been notified."

Dr. Wilkinson, of Alpena, wrote to this Office, Aug. 24, 1893, as follows:—

"Your telegram received. There would be no particular object in telegraphing the Bay City Doctor, that we can see. The epidemic is outside of this county. Our board of health sent a committee, as I wrote you, to investigate. They find as we knew all along, that the R. R. Camp was the source of all our cases. That camp is now located in the township of Metz, Presque Isle county, and diphtheria has already appeared in four places.

"Two corpses were still unburied, with no restrictions. Our object in telegraphing you was to have you go up into that county and stir them up to a sense of the danger. We did what we could when up there yesterday. This city has posted notices all along the road forbidding the people from coming to this city. We will protect ourselves if possible.

"A guard will be placed on all roads coming into the city and no person will be permitted to enter our gates. We have only one family sick with diphtheria and will take no chances on strangers, in the future."

Letters were sent from this Office on Aug. 24 and 26, to A. Kawalevski, health officer of Metz township, but no answer was received from him.

August 28, 1893, Dr. Wilkinson sent the following communication to the Secretary of this Board:—

"As you will see by the 'Echo' (Alpena), sent you, Alpena county and city have shut out the whole of Presque Isle county. Guards are placed on all roads leading into the city.

"Alpena city has diphtheria in but *one* family—4 children had the disease, 2 have died, balance are getting well. Maple Ridge has it in only three places, all carefully guarded. The health officer is coming to the front in a very satisfactory manner.

"I wish to put a legal question to you with your permission—Who is to pay the expense incurred in visiting districts outside the City, also the County and the guards placed on the different roads? I had an interview with the prosecuting attorney, also with several of the supervisors, but opinions differed.

"My construction of the law, as contained in the directions for Boards of Health and health officers, does not meet with the approval of the prosecuting attorney. He permits of all expenses for nurses, medicine, and medical attendance furnished those isolated and confined to hospitals, to be made county charge, and paid by the Board of Supervisors of the county, but all expenses for guards, for visiting outlying districts for the purpose of investigation, etc., he says cannot be made a county charge. What is your rendering of the law?"

August 30, 1893, the Secretary replied to the above letter as follows:—

"DEAR DOCTOR:—Your letter of August 28, relative to your construction of the law as contained in the directions for boards of health and health officers, is before me. I fully agree with the Prosecuting Attorney's construction of the law, as stated by you in your letter."

Sept. 5, 1895, Dr. G. L. Seaman, sent the following communication to this Office:—

"I have been in attendance on the cases of diphtheria that broke out Sunday in the township of Metz, a township that is settled by Polanders exclusively. All the cases have recovered but those that went into former reports. I have six under treatment, no deaths during the week. We have no epidemic at present time, merely sporadic cases; I hope to present to the health board a clean bill of health during next week. I have analyzed the water, find it full of microbes, as the weather has been very dry and the wells are in a filthy condition which in my opinion is the one cause of the disease."

There were 15 cases, and 3 deaths from diphtheria, in the city of Alpena, in an outbreak which lasted from March until July, 1893. Dr. Wilkinson did not give the source of contagium of any of these cases as being from Metz township.

Twenty-five cases, and seven deaths from diphtheria occurred in Maple Ridge township, Alpena county, in an outbreak which lasted from July 22, to Dec. 11, 1893, but the source of contagium was stated by the health officer to be from Loud's Camp, No. 8, situated in Millen township, Alcona county, and not from Metz township.

## *Alleged Spread of Diphtheria from Marine City to China Township, St. Clair County.*

In an outbreak of diphtheria in China township, St. Clair county, in which there were 6 cases and 2 deaths, the health officer, Henry Diem, reports the source of contagium as having been from Marine City; and also states that the disease was carried from Marine City to another jurisdiction (Clay Tp.), where two fatal cases occurred:

On Nov. 14, 1893, Mr. Diem made a report to this Office in which he said there had been 5 cases of diphtheria in his jurisdiction; the first was infected from cases in Marine City.

A "blue letter" was sent from this Office to Mr. Diem, and the following questions were asked:—

> "You say the disease was brought from Marine City, will you have the kindness to tell me who is or was sick with the disease in that place and when; also, just how the contagium was carried into your township?"

In reply to the above letter, Mr. Diem wrote to this Office, Nov. 23, 1893, as follows:

> "As to the inquiry, as to who was ill with the disease, it was a family by the name of Umlauf, at Marine City, as near as I can learn, and the woman died. To the inquiry as to how the contagium was carried into my jurisdiction, I understand that on the day this lady was buried or rather after the burial, the children were divided, and this man, Frank Kekeisen, was there and took one of the children home with him, and the result was five cases of diphtheria with two deaths out of the five.
>
> "Furthermore, there was another one of the children taken to some other place, and I understand there have been two deaths result from that."

In Mr. Diem's final report of the outbreak he says that "by keeping them isolated from the public prevented the further spread, but it went through the whole family."

Nov. 24, 1893, the Secretary of this Board wrote to Dr. F. Blagborne, health officer of Marine City, as follows:—

> "DEAR SIR:—An outbreak of diphtheria has been reported from China township, St. Clair county. The source of the contagium is alleged to have been from Marine City; that a family named 'Umlauf' had the disease recently in your city, and that the 'woman died.' Our informant says: 'I understand that the day the lady was buried, or rather after the burial, the children were divided, and this man, Frank Kekeisen, was there and took one of the children home with him, and the result was, five cases of diphtheria with two deaths out of the five,'—in China township.
>
> "Will you have the kindness to give me all the information which you can relative to the disease in the 'Umlauf' family? Was permission obtained from the health officer of China township for the removal of the infected child into his jurisdiction? Were any of the other children removed from your jurisdiction? If so, where were they taken to?
>
> "Trusting that you will give me all the information you can relative to the subject, and if the disease is still present in your city, you will keep me 'constantly informed.'"

Nov. 26, 1893, Dr. Blagborne answered the above letter as follows:—

> "In reply to yours of the 24 inst. would say: I believe there have been five cases of diphtheria in China township recently, four at Mr. Kekeisen's and one at Mrs. Gill's. Mrs. Gill's daughter was not exposed to the disease by being at Mr. Kekeisen's nor at Mr. Umlauf's, so there evidently must be some different source of contagium than the one alleged.
>
> "Mrs. Umlauf died in this city from typhoid pneumonia, according to the attending physician's statement. During her illness one of the children had an attack of tonsillitis, and the doctor in charge expressed to me some suspicion of diphtheria, and I at once placarded the house; the day following he again saw me, and wished the card removed, as he claimed the alarming symptoms had disappeared. I declined to remove the card until I was sent for two days later by him, and requested to examine the child's

throat, and after doing so I decided to remove the card, as there was no ulceration nor membrane present and the throat showed but very slight symptoms of inflammation.

"No permission was asked or obtained, either from the health officer of China or from myself, for the removal of the Umlauf child from my jurisdiction to his. Two of the Umlauf children were also taken to Clay township, by their maternal grandfather, Mr. Kaiser, where they have mingled with other children, and I have learned today that no cases of diphtheria had developed either in these Umlauf children, or in the neighborhood to which they were taken. The infant child was taken by Mr. Umlauf's father, and he today informed me that the child had not had diphtheria.

"There was an outbreak of diphtheria in the same locality in China township during April and May last, in which 13 or 14 cases were reported to the township health officer, and at that time I attended two cases in a house just across the road from Mr. Kekeisen's. The disease was at that time due to local causes. There has been one case of diphtheria reported to me since last July, a report of which I forward herewith; it was reported to me Nov. 18, and is now reported convalescent."

## *Diphtheria Carried from Detroit to Franklin Township, Houghton County.*

The following letter, dated Aug. 18, 1893, relative to diphtheria being carried from Detroit to Franklin township, Houghton county, was sent to this office by J. E. Scallon, M. D., health officer of the village of Hancock:—

"I have discovered a case of diphtheria in the family of Mr. F. H. Raymond, Franklin township, Houghton county. It illustrates forcibly the tenacity to life of the infectious agent; the danger that exists for a long time after apparent recovery, and the necessity of scrupulous attention to, and supervision of, the details of fumigation and disinfection, or destruction of infected articles by local health authorities.

"Mr. Geo. Valière's family was visiting friends in Detroit. A child was taken sick with diphtheria. Dr. Clark, of Farrand, Williams & Clark, it is said was the attending physician. The child recovered. The health officer, or somebody, went to the house to fumigate.

"Mrs. Valière's father did not believe in all this fuss and red tape, and threw out the smudge pot. Some days later other members of the family had diphtheria; no physician was called. No isolation was practiced; but the children were allowed to mingle with others, with the result that a neighbor's child contracted the same disease and died of it. I suppose no sanitary precautions were taken.

"Two weeks, or thereabout, after the apparent recovery of the Valière children, the family came back to Hancock by boat, stopped at Mr. Raymond's house, with the result already mentioned. This morning a second child is sick with diphtheria. Dr. I. M. Rhodes, Hancock, is the health officer for Franklin township.

"The cases of diphtheria (Valière) were noticed in the Detroit papers."

In response to inquiry made by this Office, I. M. Rhodes, health officer of Franklin township, Houghton county, wrote as follows:—

"On my return from Chicago, found your postal card of the 16th. In reply I will say that some time ago I was notified that a case of diphtheria was in a house in my township, but in Dr. Scallon's practice and territory—East Hancock. I saw that the proper preventive measures and treatment were given. Two mild cases occurred, both are well, and premises properly disinfected, and no further danger feared.

"Cause of outbreak,—a family that had the disease in Detroit, came by boat, stayed all night at this house, a friend's, while on their way home to Lake Linden, ten miles farther on.

"This is all I know about the case."

## *Diphtheria Alleged to have Spread from an Infected Lumber Camp in Millen Township, Alcona County, to Numerous other Localities in the State.*

During the year 1893, a number of outbreaks of diphtheria were reported to this office, in which the source of contagium was stated to be from a lumber camp, located in Millen township, Alcona county. Complaint was made to this office by health officers and residents of localities alleged to have been thus infected, that persons sick with or dead from diphtheria were allowed to leave said camp and spread the disease.

By request of the health officials and residents in several of these localities, the State Board of Health directed an inspection of the lumber camp in Millen township and letters were sent to the health officials of the township and to H. M. Loud and Sons, owners of the lumber camp, requesting them to look to the sanitary condition of the camp.

A summary of the correspondence, relative to this spread of diphtheria, was made in the office of the Secretary of this Board, including the outbreaks, cases and deaths which were reported to have occurred up to September 23. This summary was published in the "Abstract of Proceedings," (pp 5–7), of the special meeting of the Board, held in Lansing, September 29 and 30, 1893, a copy of which is given below; also, extracts from the correspondence, Dr. Hauxhurst's report of the investigation of "Camp No. 8," and a table showing the total number of outbreaks, which were alleged to have resulted directly or indirectly from infection from "Camp No. 8," with the reported numbers of cases and deaths:

### *Outbreaks of Diphtheria in Alcona, Huron, Iosco, and Sanilac Counties, the Contagium of which is Alleged to have been from "Camp No. 8" in Millen Township, Alcona County.*

In the latter part of May, 1893, it was reported to the Secretary of the State Board of Health that a man named "Corboski," who had been working at a lumber camp in Millen township, Alcona county, known as Loud & Sons' "Camp No. 8," was taken ill, went to Oscoda, and died within three days after his arrival in that village. The cause of his death was given as "Ulcerative Tonsillitis." Corboski's body was shipped, immediately after his death, to Paris township, Huron county, for burial, where a "wake" and a public funeral were held. Several families of persons who had attended the "wake" and funeral, were stricken with diphtheria. Outbreaks of the disease occurred in several localities in Huron and Sanilac counties the contagium of which was alleged to have been traced directly or indirectly to the "wake" and funeral over the body of Corboski.

In Alcona county, which lies north of Saginaw Bay, outbreaks of diphtheria occurred in several townships, the contagium of which was alleged to have been traced to "Camp No. 8."

The Secretary of the State Board of Health was in constant correspondence with the local boards of health of the several infected localities, and urged emphatically, that they put forth every effort possible to stamp out the disease.

The health officer and president of the board of health of Millen township, in which "Camp No. 8" is situated, reported that no cases of diphtheria had occurred in their jurisdiction.

Requests were received from local boards of health and individuals of seven different localities, who ascribed the cause of the outbreaks to infection from the camp referred to, that the State Board investigate the subject. In compliance with such request, the State Board employed Dr. J. W. Hauxhurst, of West Bay City, to proceed to the infected localities in Alcona county, and endeavor to ascertain the cause of the different outbreaks of the disease. After his investigation he reported that "Reliable and undisputed evidence could not be found to substantiate the statement that diphtheria originated at 'Camp No. 8,' nor that it has been the source whence all the cases in " the several townships came. "That the

Corboski case went from 'Camp No. 8' to Oscoda, died there, his body being sent to Huron county, has not been denied." * * * "That he died of diphtheria is not at all doubtful." He reported that three other men who worked at the camp referred to, went to their homes, had diphtheria, and died, and that other cases occurred in their families. He reports that he inspected the sanitary conditions of "Camp No. 8" and found everything in good condition, except the well from which water was drawn for culinary and laundry purposes. The well had been banked up with manure to prevent the pump and pipes from freezing, and that water percolated through the manure into the water in the well It does not appear from the doctor's report that water from the well was used for drinking, but it was used for culinary purposes. There is no evidence that it contained the germs of diphtheria, or that if diphtheria was there it was spread by any other than the common mode—namely, from person to person. He also found foulness at the point where a drain from the cook-room, etc., discharged into an adjacent swamp.

The following table shows the jurisdictions into which diphtheria was alleged to have spread from "Camp No. 8" located in Millen township, Alcona county; also the number of cases and deaths which have been reported from each jurisdiction, up to Sept. 23, 1893. In the majority of instances, the outbreaks have been reported as over and final reports sent in, and last reports from the other localities indicate that the disease has been practically eradicated.

| Counties and townships. | | | Cases. | Deaths. |
|---|---|---|---|---|
| "Camp No. 8," Alcona Co., Millen Tp. | Alcona Co. | *Harrisville Tp. | 19 | 10 |
| | | *Haynes Tp. | 9 | 3 |
| | | *Mikado Tp. | 1 | 0 |
| | | †Millen Tp. | 0 | 0 |
| | | *Gustin Tp. | 9 | 2 |
| | Huron Co. | *Paris Tp. | 38 | 16 |
| | | ‡Bingham Tp. | 5 | 2 |
| | | *Dwight Tp. | 7 | 2 |
| | Sanilac Co. | ‡Greenleaf Tp. | 1 | 0 |
| | | ‡Minden Tp. | 5 | 2 |
| | Iosco Co. | *Oscoda Vil. | ¶ 1 | ¶ 1 |
| Total Cases and Deaths | | | 95 | 38 |

* Infection alleged to be direct from "Camp No. 8."

† Health officer and supervisor of Millen township will not admit that diphtheria is or has been present in "Camp No. 8."

‡ Secondary infection from Paris township.

¶ "Corboski," whose body was shipped to Paris township, and conveyed the infection to the counties south of Saginaw Bay.

The following extracts are from letters and reports received at this Office, and show how general was the belief that infection came from the lumber camp in Millen township:

Letter, June 12, 1893, from Robert Dobson, the health officer of Haynes township, Alcona county. * * * "The first case was a young man, the oldest of the family, who was working in Loud's camp 8, Millen township, Alcona county, Mich., where he was taken sick and came home carrying the disease." * *

* "I have been told that a number of cases of the disease have originated or been contracted in the above mentioned camp. and steps (we think) should be taken to disinfect same."

Letter, June 30, 1893, from Dr. J. S. Corcoran, health officer of Bingham township, Huron county. * * * "The whole trouble came about from sending of the body of a person (lumber-man) from some town across the bay to his home in Paris township, where, on arrival, the coffin was opened and many neighbors exposed to the disease."

Letter, July 3, 1893, from August Abraham, the supervisor of Paris township, Huron county. * * * "The boy's name, whose body they sent down here, was Anthony Kuboctzki [Corboski]. There were quite a few came from that camp, and they were nearly all sick with diphtheria." * * * In a letter dated June 26, the same supervisor says:—"We notified the health officer of Oscoda, not to send any persons here any more, who are working in the same lumber camp, where this boy was working, whose corpse they sent down here, and still they are coming in right along with that terrible disease." * * *

Letter July 4, 1893, from Jas. S. Brown, of Harrisville township, Alcona county. "There are about fifteen families here, got diphtheria." * * * "There is a camp running here that ought to be looked after. It is camp 8."

Letter of July 6, 1893, from John Stuart, of Gustin township, Alcona county. "I have taken the liberty of writing you a few lines in regard to the Diphtheria. It is spreading rapidly throughout the county. New cases every day, and it seems that all originate from Camp No. 8." * * * "I was instructed to write to you by some of the citizens of this place." * * *

Letter, July 17, 1893, from Dr. C. S. Norton, the health officer of Gustin township, Alcona county. "I have been so busy that I have been unable to make you a correct report of the cases of diphtheria in my township, but will as soon as possible. The cases in my township and throughout the county of Alcona, that I have attended, have had their origin in Camp 8, in Millen township." * * * "Today I was called to West Harrisville and found another case of diphtheria, but this case I could easily attribute to bad water and surroundings." * * *

Letter, July 17, 1893, from "The Gustin Township Board of Health," J. H. Kilmaster, clerk of Gustin township, Alcona county. "We understand that the supervisor and health officer of the township of Millen have written you that there is no case of diphtheria at this camp (Camp No. 8), and this is perhaps the fact, but upon diligent inquiry we are able to trace every case in this county, as well as into Huron county, from Camp 8, and the facts are that as soon as a man feels symptoms of diphtheria, he at once leaves camp and repairs to his home at some other point in the county, carrying the germ of the disease with him. Now, gentlemen, if the board of health of Millen township, with a health officer in a maudlin condition, refuses to take action, we ask if children of every other resident of the county are to be sacrificed?

"A case just reported is of a young man, who only worked ten days in Camp 8, returned to his home in Mikado township, on Saturday, 15th, and on Sunday his illness developed into a well defined case of diphtheria. We strongly recommend that this polluted spot be swept from the face of the earth at once."

Copies are given below of some of the more important letters relating to the alleged spread of diphtheritic infection from "Camp No. 8."

The Secretary of this Board sent the following letter to August Abraham, Supervisor of Paris township, June 21, 1893:

"DEAR SIR:—I am in receipt to-day of a complaint from twenty-one citizens of the unincorporated village of Ubly, alleging that the public-health laws are not properly enforced in your township where diphtheria is reported to be present. It is alleged that the 'board of health seem unable to prevent people afflicted and their neighbors from coming to our village, and going from store to store thereby aiding in spreading the disease, and we request that you take some vigorous measures to prevent the spread of said disease.' The laws of this State give to local boards of health almost absolute power over everything relating to the restriction and prevention of diseases, and it would seem that, if your board of health and your health officer were doing their duty as required by law, that there would be no cause for the complaint referred to. Act 137, Laws of 1883 defines the duties of the health officer in the premises. Section 2, of the same Act, defines the penalties incurred by the health officer, if he refuses or neglects to comply with section 1, of that Act, also the penalties incurred by anyone who disobeys the orders of the health officer made in accordance with section 1. Section 8439 Howell's statutes requires you, when you 'shall know or have good reason to believe that any penalty or forfeiture has been incurred within' your 'township' * * * 'forthwith to commence and prosecute a suit, in the name of the people of this State, for the recovery thereof.'

"I enclose herewith a pamphlet (120) with the law marked bearing upon this subject, and trust that I shall soon learn that vigorous action has been taken by you, your board of health, and your health officer to prevent the further spread of the disease."

In reply to the above letter Mr. Abraham sent the following communication to this Office, June 26, 1893:

"Yours of the 21 inst. to hand. In reply I would state that I investigated the matter of the complaint from the citizens of Ubly, and cannot find sufficient ground for them to make any complaint to you. If there were people sick with diphtheria here in this town, and visiting their town and going from store to store, why did they not notify us to keep them at home, then we would take care of them immediately; but we did not know anything about the matter, so we could not do anything for them, and I think it would have been better and quicker done, if they would have notified us, instead of running around town to get signers, and notify you. If we get notice in time, we know enough to attend to our business.

"As near as we can find out, this disease was brought here from Oscoda, and I am afraid it will spread further yet, as they shipped a corpse here from Oscoda, with a doctor's certificate stating cause of death from a boil in the throat; and as it is the custom of our people here to have a wake, and sit up with the corpse all night, so the people went in there by crowds, and the next morning a public funeral was held, and they opened the coffin near the church door and looked at the corpse. Rev. Geo. Laugel, of Ruth, held the services at the funeral, so they showed him the doctor's certificate and he said it was all right. The children from the same house went to school for a week or so afterwards, without any person having any knowledge of dangerous disease. Now I would like to know if this doctor who gave the certificate would not be held responsible for this, as the man has lost three children since, without knowing that it was this dangerous disease of diphtheria.

"We notified the health oficer of Oscoda not to send any person again who had been woring in the same lumber camp where this boy was working, whose corpse they sent down here, and still they are coming in right along, with that terrible disease, so I think they should be looked after by the State Board of Health, and stop this, or else our whole township will get it, as there are a lot of boys from this township who are working in the same camp."

July 1, 1893, the Secretary of this Board sent the following letter to Dr. E. C. Beem, health officer of Oscoda village, Alcona county:—

"It is reported that the dead body of a man named 'Corboski' was shipped from Oscoda to Paris township about four weeks ago. The physician's certificate accompanying the body gave the cause of death as 'boil in throat.' The body was taken to Paris township, a 'wake' held, also a public funeral. A serious outbreak of diphtheria has occurred in that and an adjoining township, and the source of contagium is alleged to be from the dead body referred to. It is said that the man died in a lumber camp near Oscoda. Will you have the kindness to give me all the information you can relative to the subject? Did you know at the time that the body was being carried through your jurisdiction? Can you give me the name of the township in which the lumber camp is located?

"Please give me all of the information you can relative to the subject.

"I have received no reports from you, relative to diphtheria in Oscoda, since your weekly report for the week ending June 17. Please report."

July 3, Dr. Beem replied to the above letter as follows:—

"DEAR DOCTOR:—Yours of the 1st inst. at hand and contents noted. Replying, would say that the facts relative to the case of 'Corboski' are as follows, as near as I am able to learn: The cause of death as given by the attending physician (Dr. D. H. Weir) was '*Ulcerative Tonsillitis*.' He came to Oscoda the day before he died. He went to Dr. Weir's office that night, and was prescribed for by the doctor. That was the only time he was seen by the doctor. He was up around the hotel the morning he died.

"I am not able to say in what township the camp is located, where he was working. But have not heard of any cases of diphtheria in the camps, and no case has developed here from his presence here. Furthermore, I doubt the case as being diphtheria. As to the outbreak at Paris, the chances are that filthy sanitary conditions are as responsible for it as any other source. The number of deaths reported indicates a very malignant form, or poor treatment. If 'Corboski' had diphtheria, it seems strange that no case has been developed here.

"To accuse, is by no means demonstrating truth.

"The 'transit permit' I made out according to the certificate of the attending physician, and have as much reason to believe his statements as true, as I have of those made by any one else concerned in the affair.

"Hoping this will be satisfactory, I remain very respectfully."

July 19, 1893, the Secretary of this Board wrote to Mr. W. Parr, health officer of Millen township, as follows:—

"I am in receipt of a communication from the local board of health of the township of Gustin, Alcona county to the effect that 'said Camp 8' (in Millen township), in the opinion of this board is a menace to the public health, and is beyond a doubt a distributing point for *diphtheria* and other contagious diseases, and that every case of diphtheria in this and neighboring townships is traceable to the 'said camp 8.'

"You wrote to me some time ago, that there was no diphtheria in the camp referred to, and that it had been disinfected by the fumes of burning sulphur, and by steam. The communication before me, from the board of health of Gustin township, states that 'upon diligent inquiry we are able to trace every case' (of diphtheria) 'in this county as well as in Huron county, from camp 8, and the facts are, that as soon as a man feels symptoms of diphtheria, he at once leaves the camp and repairs to his home at some point in the county, *carrying* the germ of the disease with him.' The communication cites an instance of a young man who returned to his home in Mikado township, on Saturday, July 15, and on Sunday, 'his illness developed into a well defined case of diphtheria.'

"In the face of the facts mentioned in the communication from the Gustin township board of health, and the complaints which have been received from other boards of health in Alcona, Iosco and Huron counties, I would emphatically urge that you and your board of health take vigorous action, at once, to prevent the further spread of diphtheria from the infected camp. If the camp cannot be cleansed, so that it shall not be a constant source of danger, by the usual method of disinfection and cleaning, your board should act under section 1640, Howell's statutes, which requires that 'The board of health shall examine into all nuisances, sources of filth *and causes of sickness* that may, in their opinion be injurious to the health of the inhabitants within their township,' etc. From all which can be learned, this camp has not only been 'injurious to the health of the inhabitants' of Millen township, but has been seriously injurious to the inhabitants of other localities.

"You should take vigorous action at once, not only because of the danger which constantly threatens the people of your own and surrounding localities, but for your own safety. If the health officers and local boards of health, fail to do what the law requires of them, it may be difficult for them to prove themselves guiltless.

"Trusting that I may learn in the near future, that all the necessary precautions have been taken to prevent the further spread of diphtheria from 'Camp 8.'"

A letter, similar to the one above, was sent on the same date to H. W. Lyman, supervisor of Millen township. On July 24, the health officer (W. Parr) and the supervisor (H, W. Lyman), of Millen township, sent the following sworn statement, certified to by a justice of the peace, concerning the presence of diphtheria in Millen township and neighboring jurisdictions, during the past few months, and at the time the affidavit was made:—

"*H. B. Baker, Secretary of the State Board of Health, Lansing, Mich.:*

"SIR:—We are in receipt of your letters to Supervisor and Health Officer of this township in which you inform us of the opinion passed by the Board of Health of Gustin township, and requiring us to take vigorous action in regard to the alleged source of diphtheria contagium—'Loud's Camp 8.'

"In reply we wish to say that we cannot accept the opinion of the Gustin Tp. Board of Health as being at all correct when they say that 'Camp 8 is beyond a doubt a distributing point for diphtheria and other contagious diseases and that every case of diphtheria in this and neighboring townships is traceable to said Camp 8.' This statement is altogether untrue. The origin of the epidemic, as far as this locality is concerned, can be traced plainly to Oscoda and Au Sable, both in Iosco county, as we propose to show:—

"Shortly previous to last November, a family named Lacey moved from Oscoda to Curtis township, from there in Nov. they came to Harrisville township, that portion being now in the township of Millen. Diphtheria was reported as then existing in Oscoda and one of the children belonging to this family had died, it was alleged from that disease. End of November, a married daughter living with them died shortly after giving birth to a child, from throat trouble of some kind, and shortly after one of this woman's young sisters died as supposed from diphtheria. No precautions were taken or any attempt made to isolate them, and as is usual in such cases here, all the neighbors were in and out of the house during the time of sickness and after death.

"The bodies were buried in public in Harrisville cemetery. Immediately after this a child in the family of W. Ranger, living in the same locality and township, was taken sick as the parents supposed with a sore throat, which proved to be diphtheria and ended fatally. Next cases were in the family of Wm. Frazer, whose wife assisted in 'laying out' the Ranger child. Five in the family were taken down and two died. Some very feeble attempts were made at quarantine in this instance, but the father had frequently to go 3 to 4 miles to obtain the necessaries of life, meeting and mingling with the surrounding inhabitants. During the months of Dec. and Jan. fatal cases occurred in the families of H. McAdams and Jas. Kelly, both living in the neighborhood. The children of Louis Bush, some 2½ miles away, but in what was then Haynes township, also contracted the disease. No notice whatever was taken of these cases by the Haynes Board of Health. The man in fact brought the children to his mother-in-law's, Mrs. Deforest, who lives in what is called the Dean district, within five miles of the village of Harrisville. Since then cases of diphtheria have been occurring from time to time in the vicinity of Harrisville village and the surrounding country, but that portion of the townships of Harrisville and Haynes, now called Millen township, has been entirely free from that disease. Lately, within two months, cases have occurred in the village of West Harrisville, in Gustin township, which also can in our opinion be traced back to Oscoda or Au Sable, and we are informed that last Friday, 21st inst., a child in the family of one Peffer, living in W. Harrisville, died of diphtheria. There is considerable intercourse between the villages of W. Harrisville and Gustin, where a family by the name of Perry are reported as having a fatal case within the last two weeks. Perry's son and son-in-law, McQueen, came to 'Camp 8' and obtained work, 18th inst.; the foreman not knowing of this sickness, thus in our opinion carrying the danger *to*, instead of *from*, 'Camp 8.'

"In regard to the man Angus McDonald of Mikado, which you also on the authority of the Gustin Board of Health informed us, left camp sick, Saturday July 15, and on 'Sunday his illness developed into a well defined case of diphtheria.' He left camp claiming to be well on July 11, and went to Oscoda where he must have spent the time between this date and the 15th. He commenced to work at camp only on the 27th of June. All the foregoing are plain statements which we make on oath and have taken much pains to ascertain facts. This day we have visited and thoroughly inspected 'Camp 8.' The place twice this year has been disinfected by being steamed and sulphur burned, and presents an appearance of cleanliness which cannot be surpassed in any locality and might well be copied by other lumber camps in this county.

"It would give us much pleasure were it possible for any member of the State Board of Health to visit this township, as we are convinced that the measures taken by us to preserve the public health and prevent the spread of any form of contagious disease would meet with approval. If the neighboring townships would spend as much time and take as much care in guarding against infection as they do in trying to locate the blame with us, diphtheria would soon be a thing of the past in this portion of Michigan.

"We may state that we have, as a measure of precaution and to comply with your suggestions, caused a building to be set apart at 'Camp 8' to receive any form of sickness occurring there and to be there kept, completely isolated till the nature of such sickness can be placed beyond doubt. Any suggestions you may be pleased to favor us with will be promptly followed.

"We are, sir, your obebient servants,
"H. W. LYMAN, *Supervisor*,
"W. PARR, *Health Officer*.

"The statements in this letter are to the best of our knowledge true.
"H. W. LYMAN, *Supervisor*.
"W. PARR, *Health Officer*.

"Sworn and subscribed before me, D. H. Noyes, a Justice of the Peace, for Millen township, Alcona county, and State of Michigan.

"D. H. NOYES, *Justice of the Peace*,
"24 July, 1893."

The following is a copy of Dr. J. W. Hauxhurst's report relative to outbreaks of diphtheria in Gustin, Harrisville and Millen townships, Alcona county, Mich.:—

"*West Bay City, Mich., July 27, 1893.*

"*Dr. H. B. Baker, Secretary State Board of Health, Lansing, Mich.:*

"DEAR DOCTOR:—In response to your telegram, and request by letter, I started at noon, Monday, June 24th, for Alcona county, to investigate diphtheria outbreak in the townships of Gustin, Harrisville and Millen. The work has been proceeded with as rapidly as the transit problem of that section could be solved, and the report shall be given as accurately as the conflicting statements of the citizens there can be made to correspond.

"According to the best testimony I could obtain, diphtheria has appeared at various points throughout the northeastern shore counties of the State, since last October; and Tawas, Ausable, Oscoda and Alpena, together with the lumber camps tributary to them, have each furnished one or more cases. Reliable and indisputed evidence could not be found to substantiate the statement that diphtheria originated at camp No. 8; nor that it has been the source whence came all the cases of the recent outbreaks in the townships above named, as has been by some alleged.

"That the Corboski case went from camp No. 8, to Oscoda, died there, his body being sent to Huron county, has not been denied to me by any one. That he died of diphtheria is not at all doubtful. Evidence was also obtained to show that about the time Corboski left camp, three other men were taken sick, who worked there, went to their homes in the adjoining townships of Gustin and Harrisville, had diphtheria and died, their death being followed by several other cases in their families.

"Dr. Willis Parr, who is health officer of Millen township, says, a family having four children, living at the time in Ausable, lost two of them with diphtheria. They subsequently went to McDonald's camp, in Curtis township, and there lost the third child with the same disease. This woman also had a married daughter, living near Mud Lake, and she went with the fourth child to be present at her daughter's confinement. While there this last child was taken sick, died, and was buried publicly, no doctor having attended it.

"Dr. D. W. Mitchell, health officer of Harrisville township, was called to see this confined daughter found her sick with diphtheria, and within twenty-four hours from this time she also died. Other fatal cases soon followed in this same neighborhood.

"It was stated to Dr. Parr and myself yesterday, by the brakeman of the train on which we went to camp, that Mr. Cartright's children, of Cartright's camp, Curtis township, about eight miles from camp No. 8, had diphtheria there; that the camp soon afterward 'broke up' and the camp furnishings were brought to Ausable on his train. Dr. Parr then added the information that a rag dealer went to the camp at this time, gathered all the rags, baled them about one mile from Mud Lake, and shipped them south over the D. B. C. & A. R. R. Dr. Parr did not know at the time that diphtheria had been present in the camp.

"Having spent a day in Gustin township, conferring with Dr. C. S. Norton, one in Harrisville with Dr. D. W. Mitchell, and after making a thorough examination of camp No. 8, in Millen township, in company with Dr. Parr, I am prepared to report the outbreak in these places suppressed. And I am pleased to state, this fact is due to the efficient work of the health officers, who have carried out the instructions of your Board to a praiseworthy degree.

"Now, as to the sanitary condition of camp No. 8. As will be seen by the accompanying diagram, the camp is arranged in the form of a rectangle, on high ground. Beginning with the first house on the left, every building was inspected on both outside and inside, in regular order, until the foreman's house was included. All were found clean. The sleeping camp has a dingy mottled appearance on the inside, resulting from the fumigation and steaming it has received.

"The first point found having features of contamination was the *engine well.* This is a large well, partly covered, over which is erected a large tank to supply engines with water for steam, and the kitchen and laundry with washing water, through underground pipes. To prevent the upright pipes to the tank above from freezing in winter, a column of manure has been placed around them, and this has now settled down to a somewhat compact mass, about three feet square by four feet high. This is soaked by the drippings from above, which percolate through it and into the water in the well, and which of course finds its way to the kitchen and laundry. The cook admitted that he sometimes drank this water.

"The next point having any semblance of foulness was the spot where the drain discharges into the swamp, and which needs disinfecting.

"The removal of this protecting manure and pumping all the water from the well, we thought, would correct this evil; and the cess-pool will be cleaned, thoroughly washed with strong copperas water, and the place kept pure by frequent application of new lime.

"The bunks in the sleeping camp are to be torn out, new ones built, and the house treated to sulphur fumes for a whole day, as you have directed.

"I have written Mr. Loud to send to Dr. Parr the required amount of sulphur, copperas and lime, and I have confidence that the work will be done in an intelligent and complete way.

"I am convinced now that the major responsibility devolves upon health officers in townships where large camps are located, and they should have frequent promptings and encouragement from the State Board, to investigate the condition of the water-supply, and their places of sewerage deposit.

"I have the honor to be

"Yours, very truly,

J. W. Hauxhurst.

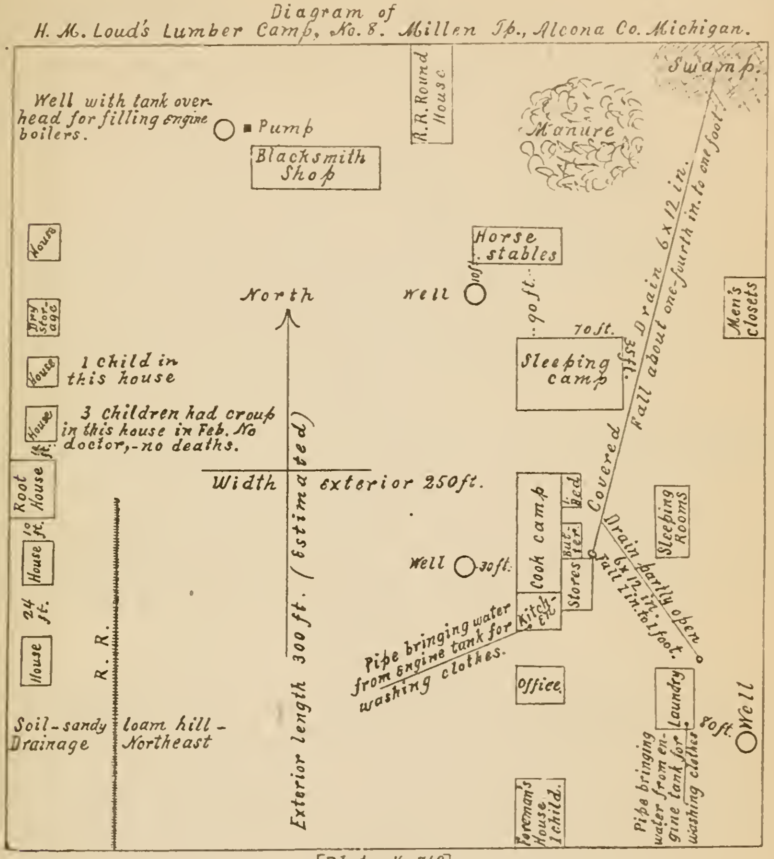
Diagram of
H. M. Loud's Lumber Camp, No. 8. Millen Tp., Alcona Co. Michigan.
Well with tank overhead for filling engine boilers.
Pump
Blacksmith Shop
R.R. Round House
Manure
Swamp.
House
Dry Storage
House
1 child in this house
House
3 children had croup in this house in Feb. No doctor,—no deaths.
North
Horse stables
Well
10 ft.
90 ft.
70 ft.
35 ft.
Sleeping camp
Drain 6 x 12 in. fall about one-fourth in. to one foot.
Covered
Men's closets
Root House
10 ft.
Width exterior 250 ft.
Exterior length 300 ft. (estimated)
House
24 ft.
House
R. R.
Well 30 ft.
Cook camp
Bed
Butter
Stores
Kitchen
Drain partly open 6 x 12 in. fall 1 in. to 1 foot.
Sleeping Rooms
Pipe bringing water from engine tank for washing clothes.
Office
Laundry
80 ft.
Well
Soil—sandy loam hill—Drainage Northeast
Foreman's House 1 child.
Pipe bringing water from engine tank for washing clothes

[Plate No. 769]

LOCALITIES INTO WHICH DIPHTHERIA SPREAD FROM "CAMP 8" MILLEN TOWNSHIP, ALCONA COUNTY.

In the following table (9) are exhibited the localities from which the health officers reported the contagium of diphtheria as having come from 'Camp 8,' either directly, or indirectly, from some locality which received its infection from 'Camp 8.' Only such reports are used in this table as would seem from the date of the secondary outbreak to have followed after a reasonable period, from some case in the first outbreak.

By referring to the map on page 167, the position of the different localities mentioned in the following table, can be seen in their respective positions in the State. The lines and arrow-heads indicate the movements of infection.

TABLE 9.—*Exhibiting the localities in Michigan to which Diphtheria spread, either directly or indirectly, from Millen township, Alcona Co., with the dates of beginning and ending of each outbreak, and the reported numbers of cases and deaths in each locality.*

| First Localities. | Second Localities. | Cases. | Deaths. | Third Localities. | Cases. | Deaths. | Fourth Localities. | Cases. | Deaths. |
|---|---|---|---|---|---|---|---|---|---|
| *Alcona Co.:*<br>Millen Tp.*<br>"Camp No. 8" | *Alcona Co.:*<br>Gustin Tp. (May 14-Aug. 28.) | 28 | 14 | *Alcona Co.:*<br>Millen Tp.* (Oct. 26-Nov. 8) | 4 | 3 | | | |
| | Harrisville Tp. (Jan. 1-Oct. 30.) | 30 | 11 | | | | | | |
| | Haynes Tp. (May 18-Aug. 7.) | 9 | 3 | | | | | | |
| | Mikado Tp. (July 16-July 29.) | 1 | 0 | | | | | | |
| | *Huron Co.:*<br>Paris Tp. (June 6-Oct. 8.) | 42 | 17 | *Sanilac Co.:*<br>Greenleaf Tp. (July.) | 1 | 0 | | | |
| | | | | *Huron Co.:*<br>Sherman Tp. (Aug. 1 —.) | 1 | 0 | | | |
| | *Iosco Co.:*<br>Oscoda village † (May 27 —.) | ---- | -- | *Huron Co.:*<br>Dwight Tp. (June 27-Aug. 1.) | 7 | 2 | *Sanilac Co.:*<br>Minden Tp. (June 18-Sept. 7.) | 7 | 4 |
| | | | | Huron Tp. (June 17-July 3.) | 3 | 0 | | | |
| | | | | Bingham Tp. (June 15-Aug. 14.) | 8 | 2 | | | |
| | | | | *Sanilac Co.:*<br>Lexington Tp. (June 20 —.) | 6 | 1 | | | |
| | *Alpena Co.:*<br>Maple Ridge Tp. (July 22-Dec. 11) | 25 | 7 | *Alpena Co.:*<br>Alpena city (Aug. 8-Dec. 11.) | 5 | 2 | *Houghton Co.:*<br>Chassell Tp. (Sept. 10 —.) | 1 | 0 |
| Cases and deaths | | 135 | 52 | | 35 | 10 | | 8 | 4 |
| No. of Localities | Second 7. | | | Third 8. | | | Fourth 2. | | |

Total number of cases, 178. Deaths, 66. Per cent of deaths to cases, 37.

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* Diphtheria was not reported from Millen township, by the health officer of that jurisdiction, until Oct. 26. (See text below.)

† The man "Corboski" arrived in Oscoda, May 27, and died the following morning. No special report of the above-mentioned case was made to this Office, it was probably included in an outbreak in Oscoda, which lasted from May 25 to June 19.

It will be seen from the report of the health officials of Millen township, and as stated in the above table, that cases of diphtheria were not found in "Camp 8" or the township of Millen, until October 26; but it seems probable that either the camp was infected or that persons contracted the disease from the cases in other parts of the same county (as persons seem to have passed back and forth, at frequent intervals, between these infected localities and "Camp 8"), and when first taken sick would go from the camp to their homes in the surrounding townships and counties, and in this way carried the infection into many localities.

The presence of a physician in such camps would probably preclude this spread of infection, as he would recognize the disease when introduced into the camp; he would see that persons having the disease were properly isolated and the premises disinfected; he would also prevent persons from leaving the camp who were likely to carry the infection.

It should be the duty of the local board of health to see that such medical inspection is made of lumbering and railroad camps, which may be located in their jurisdictions, in order to protect themselves and neighboring localities.

### *Diphtheria Supposed to be Contracted from the Slate and Pencil used by Another Patient.*

The health officer of Hopkins township, Allegan county, in a final report of an outbreak of diphtheria in his jurisdiction, gave the following as the probable source of infection:

> "The first case in this outbreak contracted the disease at school, I think, by using the slate and penci belonging to another boy who recovered from diphtheria six weeks previous to this time."

The bacillus (germ) which is now known to cause diphtheria is sometimes found in the throat of a person who has had diphtheria weeks and in rare cases months after apparent complete recovery from the disease. The pamphlet issued by the State Board of Health, on the Restriction of Diphtheria, says that three weeks "should be the shortest period of isolation after apparent complete recovery." That is in cases where bacteriological tests by experts have not been made and thus proved the absence of the specific bacillus which causes diphtheria.

### *Diphtheria Supposed to be Contracted from an Infected Feather Bed.*

Dr. W. R. Scott, health officer of Bloomingdale village, Van Buren county, made the statement on his weekly card report for the week ending Jan. 23, 1893, that the case of diphtheria mentioned on his card was caused by the renovation of a feather bed, taken from a house where there had been a case of the disease. This was the only cause that could be assigned. The case, which proved fatal, was the only one in the outbreak.

### *Diphtheria in a Cat.*

January 22, 1894, Dr. A. J. Wright, health officer of Carlton township, Barry county, wrote the following letter to this office regarding the probable infection of a cat with diphtheria, from a little girl who had the disease in December, 1893:

> "*Henry B. Baker, Sec.:*
>
> "DEAR SIR:—There was a cat that slept on a couch by the bed where the G —— girl was sick with diphtheria, the night before I visited her. In just seven days from that time the cat's throat swelled up on both sides so he could not swallow. I ordered the cat killed at once. I then examined his throat and found diphtheritic deposits on both sides, which left no doubt in my mind that the cat had a genuine case of diphtheria. I write this hoping that it may throw a little light in restricting cats and dogs from infected places where diphtheria exists. Of course the cat was buried."

## TRANSPORTATION OF PERSONS SICK WITH, OR DEAD FROM DIPHTHERIA.

### *Diphtheria Carried from Millington Village to Caro Village, both of Tuscola County.*

D. S. Stevens, M. D., health officer of Caro village, Tuscola county, reported to this Office, May 2, 1893, relative to an outbreak of diphtheria in his jurisdiction, that the disease was brought from Millington to Caro. Pamphlets on the best methods of restricting diphtheria were sent to Dr. Stevens on May 3, and on May 6, he wrote the following letter to the Secretary of this Board:—

"In relation to the case of diphtheria brought to this place last Monday, May first, and which died on the fourth.—It came from Millington on the cars, stopped at Vassar, and landed at the depot at Caro on the noon train. The child was taken sick on Friday or Saturday the week before.

"I understand they had been having diphtheria in the village of Millington for some time and had closed the school, and yet the health board allowed these people to bundle up the little boy and travel by public conveyance to Caro. When they arrived here the doctor pronounced the case malignant and fatal, at the first visit.

"I don't know what to do, I have to fight the thing alone; the board are afraid of offending the family (if it had been some *poor* family, they would have been in the cooler), consequently hesitate and do nothing. Please advise."

May 8, the Secretary of this Board answered the above letter as follows:—

"Accept thanks for your letter of May 6, and weekly report on blank 'M' for the week ending May 6, relative to diphtheria. Act 137, Laws of 1883 requires, you, as health officer, unless you are 'or shall have been instructed by the board of health' of which you are the executive officer, to 'order the prompt and thorough isolation of those sick or infected with' diphtheria. You should comply with the law without fear or favor. Prompt and thorough action should be taken at once by you and the local board of health of the village of Caro to prevent the spread of the disease.

"I enclose herewith a pamphlet with the law marked which is referred to in the preceding paragraph."

The following letter also was sent from this Office to Dr. John C. Avery, health officer of the village of Vassar:—

"I am informed by this morning's mail that a child, ill with diphtheria, was taken from Millington to Caro on May 1, and that the child 'stopped at Vassar, and landed at the depot at Caro on the noon train. The child was taken sick on Friday or Saturday, of the week before.' The child died on May 4, at Caro.

"I send you this letter trusting that the knowledge of the sick child stopping in your village may be of assistance to you in case you should have an outbreak of the disease in your village. If you *do* have an outbreak, please inform me without delay."

May 8, the Secretary of this Board sent the following letter to the president of the village of Millington:—

"DEAR SIR:—I wrote to you recently relative to an outbreak of diphtheria in your village. I am informed by this morning's mail that a child ill with the disease was carried on the cars, from your village to the village of Caro, on Monday, May 1, that the child died at Caro on May 4, also that the party with the child stopped at Vassar on their way to Caro. I would be pleased to learn whether the removal of the child was by your permission or by permission of the local board of health of your village, and if so, whether the permission of the health officer and local board of health of the village of Caro was obtained by your board, for the removal of the child into their jurisdiction.

"Will you have the kindness to give me all the information you can by return mail?"

H. A. Bishop, M. D., health officer of the village of Millington, answered the above letter, May 9, as follows:—

"In answer to your letter of the 8th, will say: On May first one of the children of F. C. Kelsey was taken sick with a sore throat. Doctor Calden was called to see the child, and called it tonsillitis in a mild form; the child grew worse until the fourth when they took it to Caro, their former home. They repeatedly asked the Dr., if it was not diphtheria, and he assured them that it was not, and that there was no danger. The child died on the sixth. I knew nothing about it until the child reached Caro; had I known, they could not have gone there. The only blame there is belongs to the attending physician. * * * Everything is being done to check the disease."

In Dr. Bishop's final report of this outbreak of diphtheria in Millington, made to this Office, June 15, 1893, he states that there were 6 cases and 1 death (not including the death which occurred at Caro), and regarding the source of contagium, in the first case, which was taken sick and then removed to Caro, he wrote as follows:—

"I did not see the boy at all. The hired girl was next taken, but made a quick recovery. It broke out in one other family of 4 children, one of whom died. I am sure the disease came from Corunna, we have had no cases here in 5 or 6 years before, and that we are rid of it now is because we took every means to prevent the spread. I was waiting until I was sure before I made the final report."

There were 3 cases and 1 death from diphtheria in the outbreak, in Caro village, as reported by the health officer.

Diphtheria was not reported from the village of Vassar, in the year 1893, until Nov. 1; this outbreak could hardly have been due to infection from the case of the boy who stopped a short time in that village while going from Millington to Caro, on May 1.

By referring to the Map on page 167, the relative positions of the city of Corunna, Shiawassee county, and the villages of Millington and Caro, in the county of Tuscola, can be seen. The lines and arrow heads indicate how the disease was carried from Corunna to Millington, and then from Millington to Caro.

### *Diphtheria Probably Contracted While Traveling.*

The following interesting report of an outbreak of diphtheria was made to this Office, Aug. 23, 1893, by H. B. Wilcox, M. D., health officer of Three Oaks village, Berrien county, in which there were four cases and two deaths. The three cases first taken sick were supposed to have been exposed while traveling. The isolation and disinfection were very thorough and the outbreak was confined to the one household:—

"In the last case the time of incubation was exactly four days. The first three cases took sick Sunday forenoon, May 7; a mother, and two children, aged 17 months, and four years and ten months, respectively. At noon, May 11, a nurse (aged 33 years) had a chill and a small membrane showed in the throat, and counting back four days we find the first three cases just nicely settled on a Santa Fé sleeper. So we conclude there was where they were exposed. Railroad company was notified to disinfect the car they came in."

In a letter which accompanied the final report of this outbreak, the health officer wrote as follows:—

"The report of diphtheria in our village was made to me today, which I hereby send you. At the time it occurred the family was duly quarantined and every precaution taken to prevent its spreading. The child was sick from Friday night until Tuesday morning. The excreta was buried; the house fumigated (80 lbs. of sulphur was used in fumigating); everything that was not burned, was thoroughly washed in sol. of cor. sub. (one to five hundred); Sulph. of iron freely used in all drains; the body was wrapped in cloths saturated in sol. of cor. sub. Report enclosed. Yours received, with enclosed blanks and circulars."

## OUTBREAKS IN WHICH ISOLATION AND DISINFECTION WERE ENFORCED,—RESULTS.

The following is the substance of a few health officers' statements which are representative of the statements of those health officers whose reports indicated that they had quite carefully enforced isolation and disinfection:—

Relative to an outbreak of diphtheria in Hopkins township, Allegan county, Michigan, which was confined to the one case (fatal), the health officer, Jas. D. Campbell, M. D., stated in his final report of the outbreak that "the case was isolated from all persons except the nurse and physician; placed in part of house away from others and all precautions taken that could be. Kept them quarantined. All rooms were fumigated by burning three pounds of sulphur to the 1,000 cu. ft. of air space. Privy disinfected with standard copperas solution. Fæces buried. All clothing and bedding disinfected. Funeral private, under my direction. No new cases have occurred."

H. B. Wilcox, M. D., health officer of Three Oaks village, Berrien county, in the final report of an outbreak of diphtheria in his jurisdiction, stated substantially as follows relative to the methods employed to prevent the spread of the disease, with the result that only the one case (fatal) occurred:—Source of contagium is not known. Patient was kept isolated from all persons except nurse and physician. A room was cleaned out, except bed, two chairs and a stand, and patient immediately taken there. The rooms were disinfected by burning five pounds of sulphur to each 1,000 cu. ft. of air space. Privy vault disinfected with sulphate of iron; clothing and bedding burned, that which was not burned was dipped in a hot solution of corrosive sublimate, 1–500. No funeral was held.

The following correspondence shows how by prompt and intelligent action of the health officers, in isolating a patient suspected of having diphtheria, the disease was restricted to the one case, although it was necessary to move the patient for some distance, and subject several houses to possible infection:—

Dr. H. B. Dodge, health officer of St. Johns village, stated in his weekly report to this office that a case of diphtheria had been sent from his jurisdiction to the "County farm." On Oct. 17, 1893, a letter was sent to Dr. Dodge, requesting the name and address of the attending physician at the "County farm." In response, Dr. Dodge, wrote to the Secretary of this Board, as follows:—

"DEAR DOCTOR:—In reply to yours of yesterday in regard to the case of diphtheria removed last week to the Clinton county poor farm, will say: that the poor farm is three and one-half miles from St. Johns in the township of Bingham. The man referred to, and who is now at the county house, came into my office one day last week complaining of a sore throat; on inquiry, found that about ten days before he had been taking care of cases of diphtheria near Fowler, this county. I regarded it as a suspicious case, and being health officer of this village, took immediate steps to quarantine him. He had no home or place to go to, and there being no provision made for such cases in this village, and being unable to get a room or a house for him in the village, and after advising with the superintendents of the poor, *they* decided the only thing they could do with him was to send him to the poor farm, and place him in a building separate from the rest of the buildings, which they did, and every precaution was taken to prevent its spread.

"This illustrates the necessity of every village providing a place for such cases. I am the attending physician and have reported it to the township health officer."

Nov. 8, 1893, Henry Palmer, M. D., health officer of the township of Bingham, made a final report of the case to this Office, in which he stated that the case had recovered; that all persons had been excluded from the patient except the nurse and physician; that more than twice the amount of sulphur required had been used in fumigating the room, and that other disinfectants had been freely used on all articles used about the patient which were not burned.

A letter was sent from this Office to Frank C. Dunn, M. D., health officer of Fowler, Clinton county, asking for information regarding the man who contracted diphtheria in that jurisdiction, and was allowed to go from there to the village of St. Johns. In reply, he wrote to this Office on Oct. 21, 1893, as follows:—

"The patient you speak of as having diphtheria at the Clinton county Poor Farm was a party who nursed some diphtheria patients in the township of Bengal. But he said that he disinfected his clothing before he left the place."

It is the duty of the health officer to superintend the movements of nurses of cases of dangerous diseases, and the law requires the health officer to disinfect clothing and premises, after the recovery of patients who have had a communicable disease, but the board of health of Bengal township, had, for the year 1893, failed to comply with the law which requires the appointment of a health officer, so that this man's movements were uncontrolled.

From the above reports it would seem that the man may have properly disinfected his clothing, but carried the infection in his system; that he was seen, when the disease first began to manifest itself, by Dr. Dodge, who acted promptly in having him properly isolated, and the subsequent management of the case was such that the disease did not spread.

### *Prophylactic Measures Recommended for Persons who are Exposed to Diphtheria.*

January 19, 1893, the following letter was sent from this Office to J. W. Hauxhurst, M. D., of West Bay City:—

"DEAR DOCTOR:—Please accept thanks for your letter of Jan. 16, reporting concerning your investigation of the alleged outbreak of diphtheria at Gaylord, Michigan, which I see you found to be a real outbreak. I trust that the locality gave you compensation. Your report is very interesting. I presume your recommendations of disinfectants agreed with those of this board. If they differed therefrom, I would be glad to know how.

"Very respectfully,
"HENRY B. BAKER, *Secretary*."

In reply to the above letter Dr. Hauxhurst wrote to the Secretary of this Board Jan. 23, 1893, as follows:—

"DEAR DOCTOR:—Your favor of January 19, is at hand. In reply I would state that my method of disinfecting rooms and clothing, which have been subjected to contagious germs, agrees with the rules and recommendations printed and distributed by the State Board of Health.

"If rooms have been used by the sick in which there was at the time much clothing, heavy wool curtains, unwashable quilts, etc., as we often find them, then I require a second fumigation with sulphur smoke, and after such clothing has been re-arranged, so that folds of it untouched by the first fumes may be thoroughly disinfected. I think this quite important.

"Another thing I think you should assume to do in your efforts to protect the public, and that is in the direction of prophylactic measures for the persons of the well, who are necessarily subjected to the surroundings of the sick with a contagious disease.

"You may think this comes within the province of the attending physician, and is not the duty of health officers, but experience has taught me it is a duty too often neglected, and that many sicken and die because such precaution is not practiced. I mean the use of disinfecting gargles and sprays for the nose and throat, by the well, and the administration of medicines which are known to increase the number and enrich the quality of the red blood corpuscles—notably iron, and perhaps quinine. I may illustrate from my own practice within the past three months:

"In the case of a nervous little girl, four years old, and who died from malignant diphtheria in ten days from attack, there was a younger brother two and a half years, and a brother older, seven years. It was impossible to separate them, owing to construction of the house, and no place could be found to take them away. There being no evidence whatever of disease in these two, when I was first called, I at once began washing their throats and nostrils thrice daily with peroxide of hydrogen, preceded by a wash of lime water to dissolve any film of membrane that might be forming on the tonsillar or nasal surfaces, for I believe in this way entrance of the specific poison, into the system, was prevented. At the same time I gave to each, and the father and mother also, tincture of the chloride of iron every four hours. In a second case, a boy seven years old, in a family of six children, ranging from four years to seventeen, I followed the same plan, including the father and mother.

"This case was more malignant than the first, lasting seven days, and died as a result of purpura hæmorrhagica complicating the original disease. These children were practically all in the same room, and yet not one of them, except the original case, was attacked.

"I cite these instances to emphasize my belief in the efficacy of such measures to ward off the disease, but I have had much other test of the treatment, to convince me that I cannot afford to neglect it.

"In answering your questions, I hope I have not overreached your request."

The Secretary of this Board wrote, January 26, 1895, thanking Dr. Hauxhurst for his interesting letter.

### ESTIMATED NUMBER OF OUTBREAKS AND CASES OF DIPHTHERIA PREVENTED AND LIVES SAVED BY ISOLATION AND DISINFECTION.

Tables 10 and 11 and the following diagram compare the average numbers of cases and deaths in outbreaks of diphtheria where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 11 it may be seen that during the seven years, 1887–93, there were over five times as many cases and deaths in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

By Table 10 it may be seen that during the year 1893 there were reported to the office of the State Board of Health 536 † outbreaks of diphtheria, with 3,133 cases and 746 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 7,386 cases and 2,042 deaths, and taking from these respectively the cases (3,133) and deaths (746) which did occur, leaves 4,253 cases and 1,296 deaths indicated as prevented in these 536 outbreaks, by isolation and disinfection. By the same method the indicated saving in the 3,117 outbreaks which occurred during the seven years, 1887–93, is 18,108 cases and 4,062 lives.

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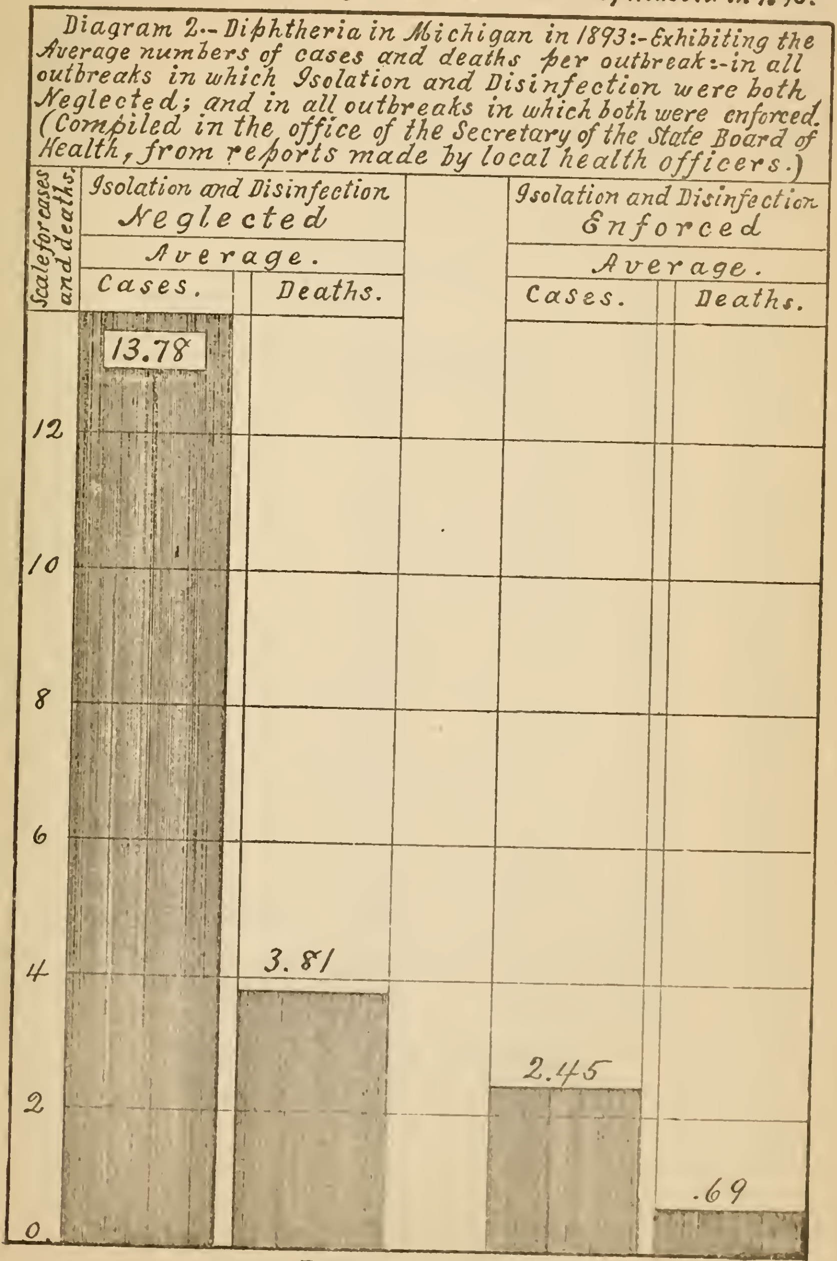
* In the compilation of the reports for Tables 10 and 11 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this Office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or Disinfection or both not mentioned, or statements doubtful."

† Whenever a break of 60 days or more has occurred in the progress of a communicable disease in a given township, village or city, it has hitherto been regarded as two different outbreaks, but in estimating outbreaks for these tables, 10 and 11, and the corresponding tables for other diseases, if the second appearance of the disease originated from the first the intermission was disregarded and it was treated as a single outbreak. Also, comparisons of *years* require that outbreaks be counted as closed at the end of the *year*; while in comparing *outbreaks* for testing the value of isolation and disinfection it is necessary to take *complete outbreaks*, even where they extend from one year into the next. This explains the apparent discrepancy between the number of outbreaks here given and the number given at the beginning of this article.

*Isolation and Disinfection Restricted Diphtheria in 1893.*



[Plate No. 770]

TABLE 10.—*Diphtheria in Michigan in 1893: Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 536 outbreaks reported; (2) in the 303 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 9 outbreaks in which Disinfection was enforced and Isolation doubtful; (4) in the 56 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 14 outbreaks in which Disinfection was enforced and Isolation neglected; (6) in the 16 outbreaks in which Isolation was enforced and Disinfection neglected; (7) in the 74 outbreaks in which Isolation and Disinfection were both neglected; (8) in the 65 outbreaks in which Isolation and Disinfection were both enforced.*

| | (1) All outbreaks. (536 outbreaks.*) | | (2) Isolation or Disinfection or both not mentioned, or statements doubtful. (303 outbreaks.) | | (3) Disinfection enforced—Isolation doubtful. (9 outbreaks.) | | (4) Isolation enforced—Disinfection doubtful. (56 outbreaks.) | | (5) Disinfection enforced—Isolation neglected. (14 outbreaks.) | | (6) Isolation enforced—Disinfection neglected. (16 outbreaks.) | | (7) Isolation and Disinfection both neglected. (74 outbreaks.) | | (8) Isolation and Disinfection both enforced. (65 outbreaks.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| Totals .... | 3,133 | 746 | 1,681 | 362 | 31 | 4 | 143 | 32 | 63 | 15 | 36 | 5 | 1,020 | 282 | 159 | 45 |
| Averages.. | 5.85 | 1.39 | 5.55 | 1.19 | 3.44 | .44 | 2.55 | .57 | 4.50 | 1.07 | 2.25 | .31 | 13.78 | 3.81 | 2.45 | .69 |

* These do not include the cases and deaths in Detroit, Grand Rapids and Bay City, because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease is present in some part of the city nearly all the time. See foot-note on page 194.

## RESTRICTION OF DIPHTHERIA IN MICHIGAN.

TABLE 11.—*Exhibiting for the eight Years, and for each of the eight Years, 1886–93, the number of Reported Outbreaks, Cases and Deaths; also for this eight-year Period, the average number of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection was Doubtful; in which both Isolation and Disinfection were Neglected; in which both Isolation and Disinfection were Enforced; and also the Number of Cases and Deaths Indicated to have been prevented by Isolation and Disinfection.*

| Years. | Indicated Saving of Cases and lives by Isolation and Disinfection.* | | All Outbreaks,† | | | Isolation or Disinfection, or both, not Mentioned, or Statements Doubtful. | | | Isolation and Disinfection both Neglected. | | | Isolation and Disinfection both Enforced. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cases. | Deaths. | Out-breaks. | Cases. | Deaths. | Out-breaks. | Cases. | Deaths. | Out-breaks. | Cases. | Deaths. | Out-breaks. | Cases. | Deaths. |
| 1886 | * 4,374 | * 833 | 461 | 3,085 | 656 | 243 | 1,103 | 250 | ‡ 102 | ‡ 1,650 | ‡ 329 | 116 | 332 | 77 |
| 1887 | § 3,132 | § 733 | 398 | 2,321 | 561 | 202 | 732 | 190 | 60 | 822 | 195 | 78 | 198 | 51 |
| 1888 | 3,292 | 416 | 311 | 1,529 | 324 | 199 | 810 | 189 | 34 | 527 | 81 | 58 | 101 | 31 |
| 1889 | 2,398 | 570 | 376 | 1,986 | 418 | 254 | 1,314 | 280 | 41 | 478 | 108 | 63 | 98 | 14 |
| 1890 | 2,362 | 426 | 439 | 2,713 | 619 | 291 | 1,649 | 401 | 71 | 902 | 169 | 46 | 70 | 15 |
| 1891 | 3,392 | 666 | 532 | 2,965 | 643 | 366 | 1,777 | 389 | 79 | 914 | 194 | 70 | 157 | 33 |
| 1892 | 3,146 | 746 | 525 | 3,485 | 740 | 323 | 2,341 | 456 | 52 | 657 | 147 | 49 | 105 | 24 |
| 1893 | 4,253 | 1,296 | 536 | 3,133 | 746 | 303 | 1,681 | 362 | 74 | 1,020 | 282 | 65 | 159 | 45 |
| Totals | 26,849 | 5,686 | 3,578 | 21,217 | 4,707 | 2,181 | 11,407 | 2,517 | 411 | 5,350 | 1,176 | 545 | 1,220 | 290 |
| Averages | 3,356 | 711 | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- | -------- |
| Average cases and deaths per outbreak | -------- | -------- | -------- | 5.95 | 1.37 | -------- | 5.23 | 1.15 | -------- | ‖ 13.02 | ‖2.86 | -------- | ‖2.07 | ‖.50 |

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* For the year 1886 the number of cases and deaths in this double column are found by multiplying "all outbreaks" for the year by the average number of cases or deaths per outbreak in those outbreaks in which Isolation or Disinfection or both were neglected, for that year, and deducting from the result thus obtained, the cases or deaths, as the case may be, which were *reported* to have occurred that year.

† Outbreaks in Detroit, Grand Rapids and Bay City not included.

‡ The figures for the first year (1886) in this column are for outbreaks in which "Isolation or Disinfection or Both were neglected,"—outbreaks not having been compiled for the column "Isolation and Disinfection Both Neglected" for that year, as there were too few reports of outbreaks which could be thus classified.

‖ Averages for the seven years 1887–93.

§ For the years 1887–93 these results are obtained in the same manner as stated in the (*) foot-note above, except that "All Outbreaks" for each year are multiplied by the average number of cases or deaths per outbreak in those outbreaks in which "Isolation and Disinfection both were neglected."

TABLE 12.—*Exhibiting the reported Period of Incubation, stated in days, in 72 cases of Diphtheria. Compiled from reports of health officers in Michigan, for the year 1893.*

| Incubation period—Days... | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 15 | 17 | 18 | 21 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cases in each period........ | 8 | 1 | *3 | 11 | 2 | †11 | ‡11 | §3 | 2 | ¶2 | 1 | ‖3 | 2 | 8 | 2 | **1 | 1 |

* In 1 of these cases it was reported as *about* 4 days.
† In 5 of these cases it was reported as *about* 7 days.
‡ In 2 of these cases it was reported as *about* 8 days.
§ In 1 of these cases it was reported as *about* 9 days.
¶ In 1 of these cases it was reported as *about* 11 days.
‖ In 1 of these cases it was reported as *about* 14 days.
** This case was reported as *about* 3 weeks.

The Average period of incubation of diphtheria in the 72 cases is 7.9 days.

TABLE —.—*Exhibiting, relative to Diphtheria in Twenty-seven Instances in Michigan in 1893, the Reported Period of Incubation, within certain Limits, stated in Days; also the Means, the Average of which may Represent the Average Period of Incubation.*

| In six Instances. | | In six Instances. | | In six Instances. | | In six Instances. | | In three Instances. | |
|---|---|---|---|---|---|---|---|---|---|
| Days. | Means. | Days. | Means. | Days. | Means. | Days. | Means. | Days. | Means. |
| 3-4 | 3.5 | 4-6 | 5 | 4-10 | 7 | 5-10 | 7.5 | 10-12 | 11 |
| 3-6 | 4.5 | 4-6 | 5 | 4-10 | 7 | 5-15 | 10 | 10-16 | 13 |
| 3-7 | 5 | 4-6 | 5 | 4-12 | 8 | 7-10 | 8.5 | 15-24 | 19.5 |
| 3-7 | 5 | 4-6 | 5 | 5-7 | 6 | 7-28 | 17.5 | ............ | .......... |
| 3-8 | 5.5 | 4-7 | 5.5 | 5-8 | 6.5 | 8-10 | 9 | ............ | .......... |
| 3-10 | 6.5 | 4-8 | 6 | 5-9 | 7 | 8-12 | 10 | ............ | .......... |

The average of all the means, for the 27 instances, is 7.4 days.

## AGES OF GREATEST PREVALENCE OF, AND MORTALITY FROM, DIPHTHERIA.

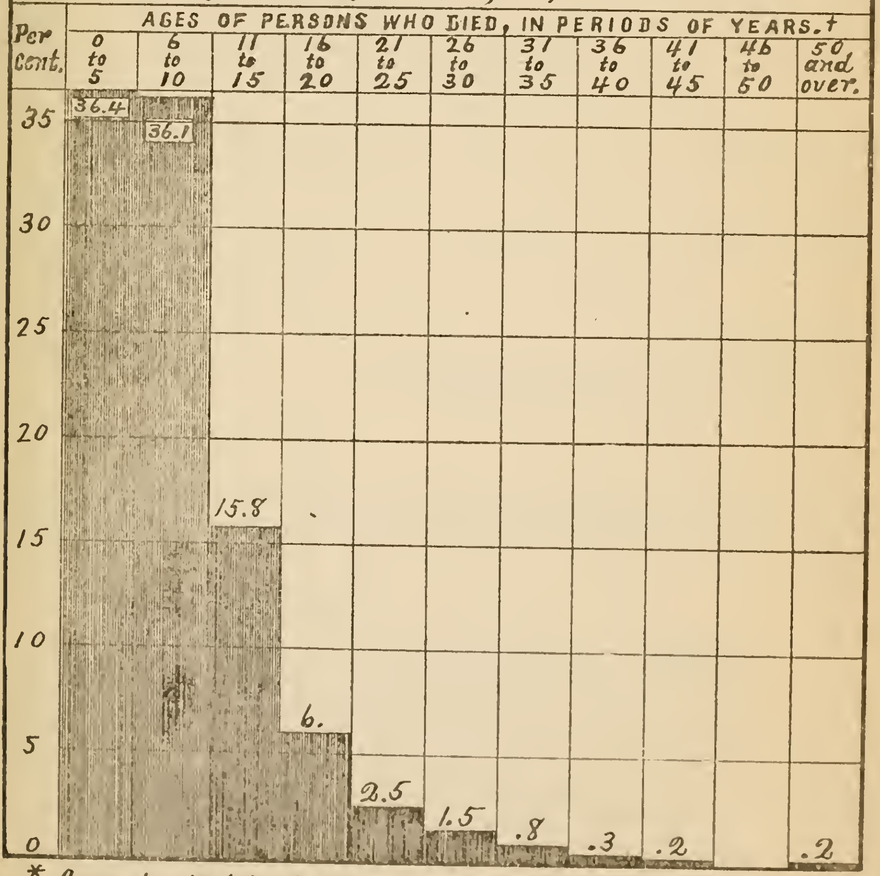
In Table 13 are shown the numbers of cases and deaths from diphtheria in Michigan in 1893, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age-groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in special groups were of all deaths.

Table 14 gives the percentages that the cases and deaths which occurred in certain age-groups were of all cases and deaths where the ages were given in the health officers' reports. The percentages for the year 1893 are taken from Table 13; percentages for 1892, from a similar table in the Annual Report for the year 1893.

It will be seen that the percentages in corresponding age-periods agree quite nearly for the two years.

Diagram 3 exhibits what per cent the deaths in certain age-groups were of all deaths from diphtheria where the ages were stated (911) in the reports received at this office during the years 1892–93. By accumulating similar statistics for a few years we may have an accurate diagram, exhibiting the ages at which diphtheria is most to be dreaded, and at which greatest precaution should be taken against contracting the disease.

Diagram 3.—Exhibiting what per cent of all Deaths from Diphtheria were of persons within certain periods of age; (In each group, first and last years are included.) Computed from 911 Deaths in Michigan during the 2 years, 1892–93.*



*As reported to the Secretary of the State Board of Health; Compiled from all reports for the years 1892–93, which stated the ages at which persons died of diphtheria.

† In each group the first and last years are included.

[Plate No. 767]

TABLE 13.—*Exhibiting in certain Age-Groups,* the number of Cases and the number of Deaths from Diphtheria; the per cent that the cases in each group were of All Cases; the per cent that the Deaths in each group were of All Deaths; and the per cent that the Deaths in each group were of the Cases in that group,—Compiled from all reports for the year 1893 which stated the ages.*

| | Number and per cent of Cases and Deaths in certain Age-groups. | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ages in groups of years | All Known Ages. | 0–1. | 2. | 3. | 4. | 5. | 0–5. | 6–10. | 11–15. | 16–20. | 21–25. | 26–30. | 31–35. | 36–40. | 41–45. | 46–50. | 51 and over. |
| No. of cases | † 1,429 | 37 | 50 | 53 | 82 | 80 | 302 | 428 | 254 | 156 | 101 | 70 | 48 | 31 | 15 | 13 | 11 |
| Per cent the cases in each group were of all cases | 100 | 2.6 | 3.5 | 3.7 | 5.8 | 5.6 | 21.1 | 30 | 17.8 | 10.9 | 7.1 | 4.9 | 3.4 | 2.2 | 1.1 | 0.9 | 0.7 |
| No. of deaths | † 435 | 24 | 33 | 33 | 42 | 34 | 166 | 155 | 58 | 32 | 12 | 7 | 3 | 0 | 1 | 0 | 1 |
| Per cent the deaths in each group were of cases in that group | 30.4 | 64.9 | 66 | 62.3 | 51.2 | 42.5 | 54.9 | 36.2 | 22.8 | 20.5 | 11.9 | 10 | 6.4 | 0 | 6.7 | 0 | 9.1 |
| Per cent the deaths in each group were of all deaths | 100 | 5.5 | 7.6 | 7.6 | 9.7 | 7.8 | 38 | 36 | 13 | 7.4 | 2.8 | 1.6 | 0.7 | 0 | 0.2 | 0 | 0.2 |
| Per cent the deaths in special groups were of all deaths | -------- | 38.2 | | | | | 74 | | 23.2 | | | 2.7 | | | | | |

* In each group the first and last years are included.
† Does not include those cases or deaths where the age was not stated.

TABLE 14.—*Exhibiting in certain Age-Groups,* the number of Cases and the number of Deaths from Diphtheria in each of the years 1892–93; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of all Deaths,—Compiled from all reports for the years 1892–93 which stated the ages.*

| | | | Per Cent of Cases and Deaths in certain Age-groups.* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | | Total No. included. | All Ages. | 0 to 5. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. | 46 to 50. | 51 Years and over. |
| 1892. | Cases | 2,065 | 100 | 22.0 | 32.7 | 21.0 | 9.5 | 5.8 | 3.5 | 2.3 | 1.8 | 0.8 | 0.6 | 0.5 |
| | Deaths | 476 | 100 | 34.9 | 36.6 | 18.1 | 4.8 | 2.3 | 1.5 | 0.8 | 0.6 | 0.2 | 0 | 0.2 |
| 1893. | Cases | 1,429 | 100 | 21.1 | 30 | 17.8 | 10.9 | 7.1 | 4.9 | 3.4 | 2.2 | 1.1 | 9.9 | 0.7 |
| | Deaths | 435 | 100 | 38 | 36 | 13 | 7.4 | 2.8 | 1.6 | 0.7 | 0 | 0.2 | 0 | 0.2 |
| 1892–93. | Cases | 3,494 | 100 | 22 | 32 | 20 | 10 | 6 | 4 | 3 | 2 | .9 | .7 | .6 |
| | Deaths | 911 | 100 | 36.4 | 36.1 | 15.8 | 6 | 2.5 | 1.5 | .8 | .3 | .2 | .0 | .2 |

* In each group the first and last years are included.

TABLE 15.—*Exhibiting, by Sex for each year of Age, and in certain Age-groups, (first and last years in each group included), the number of persons who died from Diphtheria during the year 1893, and the per cent the deaths in each Age-group were of deaths at all ages. (Compiled from such reports to the State Board of Health, as stated the sex and age.)*

| Sex. | Ages in Years, and groups of Years. | All ages known. | 1–5. | | | | | 6–10. | | | | | 11–15. | | | | | 16–20. | | | | | 21–25. | 26–30. | 31 and Over. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | | | |
| Males. | No. of Deaths, by single Years | ---- | 11 | 15 | 19 | 24 | 19 | 19 | 16 | 11 | 15 | 9 | 2 | 9 | 3 | 3 | 2 | 5 | 6 | 4 | 2 | 3 | | | |
| | No. of Deaths, by Groups of Years | 207 | 88 | | | | | 70 | | | | | 19 | | | | | 20 | | | | | 7 | 1 | 2 |
| | Per cent the Deaths in each age-group were of the total deaths among Males | 100 | 42.5 | | | | | 33.8 | | | | | 9.2 | | | | | 9.7 | | | | | 3.4 | 0.5 | 1.0 |
| | Average age at Death, from Diphtheria | 8.1 | | | | | | | | | | | | | | | | | | | | | | | |
| Females. | No. of Deaths, by single Years | ---- | 13 | 18 | 14 | 18 | 15 | 17 | 20 | 22 | 14 | 12 | 8 | 11 | 9 | 6 | 5 | 2 | 2 | 7 | 1 | 0 | | | |
| | No. of Deaths, by Groups of Years | 22 | 78 | | | | | 85 | | | | | 39 | | | | | 12 | | | | | 5 | 6 | 3 |
| | Per cent the Deaths in each age-group were of the total deaths among Females | 100 | 34.2 | | | | | 37.3 | | | | | 17.1 | | | | | 5.3 | | | | | 2.2 | 2.6 | 1.3 |
| | Average age at Death, from Diphtheria | .8 | | | | | | | | | | | | | | | | | | | | | | | |
| Both Sexes. | No. of Deaths, by single Years | ---- | 24 | 33 | 33 | 42 | 34 | 36 | 36 | 33 | 29 | 21 | 10 | 20 | 12 | 9 | 7 | 7 | 8 | 11 | 3 | 3 | | | |
| | No. of Deaths, by Groups of Years | 435 | 166 | | | | | 155 | | | | | 58 | | | | | 32 | | | | | 12 | 7 | 5 |
| | Per ct. the deaths in each age-group were of the total deaths from diphtheria in both sexes | 100 | 38.2 | | | | | 35.6 | | | | | 13.3 | | | | | 7.4 | | | | | 2.8 | 1.6 | 1.1 |
| | Average age at Death, from Diphtheria | 8.5 | | | | | | | | | | | | | | | | | | | | | | | |

TABLE 16.—*Exhibiting, by Sex and in certain Age-groups, the per cent of persons who died from Diphtheria in Michigan, during the two years and each of the two years, 1892–93; also the average age at death, and the number of deaths included. (Compiled from such reports as stated the ages.)*

| Deaths from Diphtheria. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | Average age, Years. | No. of Deaths included. | Age,—In Periods of Years. Per Cent of Deaths in each Period of Age.* | | | | | | | |
| | | | | All ages. | 0 to 5 | 6 to 10 | 11 to 15 | 16 to 20 | 21 to 25 | 26 to 30 | 31 Years and over. |
| 1892. | Males | 7.1 | 231 | 100 | 46 | 32 | 16 | 4 | 1 | 1 | ---------- |
| | Females | 8.7 | 240 | 100 | 41 | 31 | 15 | 5 | 2 | 3 | 2 |
| 1893. | Males | 8.1 | 207 | 100 | 43 | 34 | 9 | 10 | 3 | 1 | 1 |
| | Females | 8.8 | 228 | 100 | 34 | 37 | 17 | 5 | 2 | 3 | 1 |
| 1892–93. | Males | 7.6 | 438 | 100 | 44 | 33 | 13 | 7 | 2 | 1 | 0.5 |
| | Females | 8.8 | 468 | 100 | 38 | 34 | 16 | 5 | 2 | 3 | 2.0 |

* Arranged in five-year periods, the first and last years in each period included.

Table 16 gives a summary of the material contained in Table 15, and of a similar table made for the previous year. The combined material for these two years (1892–93) is also in Table 16. The average age at death from diphtheria in these years was, for males, 7.6; for females, 8.8 years.

There were 30 more deaths of females than of males during the two years.

### AVERAGE DURATION OF DIPHTHERIA.—FATAL AND NON-FATAL CASES.

*Fatal Cases.*

TABLE 17.—*Exhibiting by Sex of patient, the duration (in days) of fatal cases of sickness from Diphtheria, in Michigan, during the year 1893. Arranged in five-day groups, the first and last days in each group inclusive. (Compiled from those reports which stated the length of time the patient was sick.)*

| Fatal cases of Diphtheria. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | No. of cases included. | Duration of Sickness:—Per cent of Deaths in each Period of Days. | | | | | | | |
| | | | All cases. | 0 to 5 days. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. |
| 1893. | Males | 192 | 100 | 35 | 43 | 13 | 5 | 2 | 1 | 0 |
| | Females | 203 | 100 | 38 | 36 | 15 | 6 | 3 | 1 | .5 |

From Table 17, it may be seen that of the 192 males who were reported to have died from diphtheria in 1893, and of which the interval between the day of being taken sick and the day of death was given, the largest per cent died in the period including the 6th to the 10th days of sickness; and the next highest per cent died in the period of the first 5 days; while with 203 females reported as having died in the same time, the largest per cent died in the period of the first 5 days, and the next highest per cent in the period including the sixth to the tenth days.

Seventy-eight per cent of the males and 74 per cent of females died before the 11th day of sickness.

The average duration of the fatal cases, in 1893, was 8 days, alike for males and females.

*Non-Fatal Cases.*

TABLE 18.—*Exhibiting by Sex of patient, the Duration (in days) of Non-Fatal cases of sickness from Diphtheria, in Michigan, during the year 1893. Arranged in five-day groups, the first and last days in each group inclusive. (Compiled from those reports which stated the length of time the patient was sick.)*

| Non-Fatal Cases of Diphtheria. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | No. of cases included. | Duration of Sickness:—Per Cent of Cases in each Period of Days. | | | | | | | | |
| | | | All Periods. | 0 to 5 | 6 to 10 | 11 to 15 | 16 to 20 | 21 to 25 | 26 to 30 | 31 to 35 | 36 days and over. |
| 1893. | Males | 442 | 100 | 9 | 35 | 25 | 14 | 9 | 4 | 2 | 3 |
| | Females | 517 | 100 | 8 | 37 | 27 | 12 | 8 | 4 | 3 | 2 |

In Table 18 it may be seen that in non-fatal cases of diphtheria for the year 1893, the duration of sickness in five-day periods was nearly the same in both sexes; that 69 per cent of the males and 72 per cent of the females recovered before the 16th day of sickness.

The average duration was: males 14, females 13 days.

## DIPHTHERIA IN DETROIT IN 1893.

During the year ending Dec. 31, 1893, there were reported 639 cases of diphtheria and 183 deaths from that disease, in the city of Detroit. This shows a reduction of nearly one-half in the number of cases of diphtheria compared with the number reported from Detroit in 1892; but the per cent of cases which proved fatal was greater in 1893 than in 1892; 27 per cent of the cases proved fatal in 1892, and 29 per cent in 1893.

In 1892 the health officers in nine different localities in the State reported the source of the diphtheritic infection in their jurisdictions as being from Detroit; and in seven other instances the statement was made by the health officer that the source of contagium was "probably" from Detroit.

In 1893 the source of contagium in diphtheria outbreaks was reported as from Detroit, in eight instances. The Map "Movement of Contagium of Diphtheria," page 167, shows the localities thus reported. Lines connecting outside localities with Detroit indicate the movement of infection.

A conference between a special committee of the State Board of Health and members of the city board of health of Detroit was held in that city April 28, 1892. (In the "Abstract of Proceedings" of the regular meeting of the State Board of Health, July 12, 1892, pages 10-16, and in the first part of the Annual Report of the Board for the year 1892, pages lix-lxi, is a report of the meeting held in Detroit.) Following this conference there seems to have been greater effort, on the part of the health officials of Detroit, to restrict the spread of communicable diseases, and with good results, as shown by the diminished numbers of cases and deaths from this class of diseases, as stated above, and as given in the following newspaper article, published in the Detroit Tribune of March 7, 1893:

### "THE QUARANTINE.

#### "TO IT DR. DUFFIELD ATTRIBUTES THE DECREASE IN DISEASE.

"The reports at the health office show that there is considerably less diphtheria and scarlet fever in the city at the present time than there was a year ago. Dr. Duffield attributes this not to the cold weather but to the system of quarantine put into operation last June. In January of last year there were 115 cases of diphtheria in the city, as against 122 in January, 1891. During January of the present year there were but ninety-six cases.

"The figures are more striking in the case of scarlet fever. In January, 1891, there were but 44 cases in the city. The disease increased steadily, however, and in December of that year the number of cases had reached 161. A slight falling off occurred during the spring, as is usual, but in June, 1892, when the quarantine went into effect, there were 136 cases in the city. The number decreased at once, there being 101 cases in July, sixty-one in August, fifty-two in September, fifty-two in October, and forty-one in November. In December the approach of cold weather brought the number to eighty, as against 161 the year before. During the January just passed there were 103 cases, as against 167 in January, 1892. In spite of the reduction in the number of cases which occurred after the quarantine system went into effect there were 759 more cases of contagious disease in 1892 than in 1891.

"The death rate of the city is also much less than it was a year ago. In January, 1891, the death rate was 26.49 per 1,000, figured on a population of 220,000. In January, 1893, the death rate was but 17.91, based on a supposed population of 230,000. According to the estimate of the water board the city has a population now of 238,000, which would bring the death rate lower."

The following statements regarding the prevalence of communicable diseases in Detroit, and recommendations for the restriction of the same, were promulgated, by the Secretary of this Board, May 22, 1893:

### A PLEA FOR ISOLATION HOSPITALS IN DETROIT.

#### "PREVENTABLE LOSSES BY SICKNESS IN DETROIT.

"Bearing upon the subject of the proposed appropriation for contagious disease hospitals, and the reörganization of the local board of health, it should be understood that some such changes seem to be imperative if Detroit is to take its proper place among healthful cities. Objection is made to the effort because no epidemic is yet present, but an epidemic has been permitted to continue in Detroit for several years; from diphtheria and from scarlet fever the death-rate has been excessive compared with other cities, and especially compared with the rest of this State. The city health officer has urgently pleaded for isolation hospitals, the State Board of Health has earnestly recommended such needful facilities, and yet the beneficent movement for the saving of human life and money values is opposed, and Detroit is still a dangerous center of infection for the entire State of Michigan. If Detroit does not take such action the State, for its own protection, can well afford to appropriate sufficient money to equip hospitals for the proper isolation of diphtheria and scarlet fever in Detroit, and thus better protect the rest of the State.

"But Detroit can much better afford to pay two hundred thousand dollars *per year* than to permit so many deaths, so much sickness, and so much consequent money loss as has been caused in the city in recent years by preventable sickness and deaths from diphtheria and scarlet fever. In 1890 the reported cases of diphtheria per ten thousand inhabitants in the entire State was twenty, while in the city of Detroit it was sixty; and the ratio of deaths to cases was greater in Detroit than in the entire State.

"In 1892 the reported cases and deaths from diphtheria and scarlet fever in Detroit were diphtheria cases 1,194, deaths 326; scarlet fever cases 1,502, deaths 188. Possibly this does not include all.

"I think we may safely assume that each case of sickness costs at least twenty dollars, each funeral forty dollars, and each life lost by scarlet fever or diphtheria would, if saved, have earned for the community five hundred dollars more than the cost of maintenance. On this basis, the reported cases and deaths in Detroit in 1892 from these two diseases involved money losses aggregating *over three hundred and thirty thousand dollars.* This represents the taxes levied in a single year by sickness and deaths in Detroit from two diseases which are well known to be in great part preventable. The statistics collected by the State Board of Health prove that four-fifths of the cases and deaths from both of these diseases are prevented by proper isolation and disinfection. Proper isolation and disinfection ought to be enforced in Detroit. It cannot be done except by providing well-equipped and well-managed isolation hospitals.

"It is not well to have such dangerous diseases as diphtheria and scarlet fever treated at the same isolation hospital; there should be a separate hospital for each dangerous communicable disease. In some cities where such diseases are treated at the same hospital, children have to undergo the great risk of two diseases at the same time. Detroit imperatively needs at least two isolation hospitals, one for diphtheria and one for scarlet fever. I think it would be better and cheaper in the end to have more than the two. Notwithstanding all our efforts for quarantine, small-pox, typhus fever, or cholera might come to Detroit.

"Respectfully submitted,

"HENRY B. BAKER."

"Lansing, Michigan, May 22, 1893."

## SCARLET FEVER IN MICHIGAN.—YEAR ENDING DECEMBER 31, 1893.

During the year ending December 31, 1893, there were reported to the Secretary of the State Board of Health 675 outbreaks of scarlet fever in 566 localities in Michigan, which resulted in 6,065 cases and 415 deaths. Notwithstanding the marked improvement which has occurred both in promptness and accuracy of reports of local health officials to the central office, it is probable that not all cases of and deaths from scarlet fever are yet reported. For the year 1893 there were reported to the Secretary of State 360 deaths from scarlet fever, 55 less than were reported to this office; and the Secretary of the State Board of Health estimates that the deaths reported to the Secretary of State should be increased by about 40 per cent to equal the actual number of deaths which occur. According to this estimate, there were about 504 deaths from scarlet fever during 1893, in Michigan, instead of 415, as reported to the State Board of Health.

### DISTRIBUTION OF SCARLET FEVER IN 1893.

The following Tables, 1 and 2, and accompanying map, exhibit, in different ways, the distribution of the reported scarlet fever in Michigan, in 1893. Table 1 shows that the sickness-rate from this disease, for the year, for the whole State, was 27.5 cases per 10,000 of estimated population;* and that the death-rate per same number of inhabitants, was 1.9. Said Table 1, shows also that the greatest sickness-rate from this disease, in 1893, was in Alger county, where the ratio of cases to population was 252.2 to 10,000. Other counties where the sickness-rates were largely in excess of the average rate for the State, were:—Lake, 181.9; Wexford, 131.0; Osceola, 103.7; Marquette, 81.8; Alcona, 81.3; Mackinac, 73.1, cases per 10,000 of population. The lowest sickness-rate for the year, 2.3 cases per 10,000 of population, was in Iosco county. Other counties whose sickness-rates were much *below* the average for the State, were:—Huron, 3.2; Delta, 3.3; Leelanaw, 3.3; Iron, 4.0; Chippewa, 4.1, cases per 10,000 of population. The greatest death-rate from this disease during the year, 23.6 deaths per 10,000 of population, was in Otsego county. Other counties where the death-rates were much above the average death-rate for the State, were:—Lake, 21.5; Wexford, 12.7; Mackinac, 12.2; Gogebic, 10.1; Osceola, 8.1; Alger, 7.4; Houghton, 6.7; Gladwin, 6.4, deaths per 10,000 of population. The lowest death-rate, .2 of one death per 10,000 of population, was in Genesee and Washtenaw counties. Other counties where the death-rates were far *below* the average death-rate for the State, were:—Gratiot, Huron, Ionia, Muskegon, Shiawassee, Tuscola, .3; Clinton, .4; Newaygo, .5; Montcalm, .6; Oakland, .7; Lenawee, .8; Monroe, St. Clair, Calhoun, and Eaton, .9 deaths per 10,000 of population. From the following eleven counties: Arenac, Baraga, Crawford, Isle Royal, Keweenaw, Luce, Manitou, Midland, Ontonagon, Oscoda and Sanilac,—having an aggregate estimated population of 73,548—no scarlet fever was reported during the year.

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*For basis of estimate, see footnote to Table 2.

The fatality from scarlet fever in 1893,—i. e., the proportion of reported cases which proved fatal, was, for the whole State, 6.8 per cent, or about one death to 14.6 cases. The maximum fatality-rate (37 per cent of reported cases) occurred in Otsego county. The minimum fatality-rate (.7 of one per cent of reported cases) occurred in Genesee county. Other counties where the fatality was considerably *greater* than the average fatality for the State, were:—Delta and Iosco, 33.3; Benzie, 26.6; Gladwin, 25 per cent of reported cases. Other counties where the fatality was considerably *less* than the average for the State, were:—Ionia, .8; Tuscola, .9; Shiawassee, 1.0; Washtenaw, 1.2; Clinton, 1.4 per cent of reported cases.

Although the sickness-rate was higher for this year in Alger county than in any other county in the State, the fatality in this county was only 2.9 per cent of the reported cases, while the average for the State was 6.8 per cent of reported cases.

The Map which follows Table 1, shows for each county of the State the sickness and death rates per 10,000 of population;* the number of localities where the disease was present during the year, and the number of outbreaks which occurred in those localities.

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* For this map, the population used was as estimated, for 1893, by Dr. C. L. Wilbur, Chief of Vital Statistics in the Michigan "State Department," the estimate being by the arithmetical method employing the data in the U. S. Census of 1890 and the State Census of 1894.

TABLE 1.—*Numbers of Cases and Deaths reported from Scarlet Fever per 10,000 persons living in each county in Michigan during the year 1893. (Compiled from reports of health officers, clerks, etc.)*

| Counties. | Estimated* population of Michigan for 1893. | Number of reported | | Number per 10,000 population, of | |
|---|---|---|---|---|---|
| | | Cases. | Deaths. | Cases. | Deaths. |
| State | 2,204,563 | 6,065 | 415 | 27.5 | 1.9 |
| Alcona | 5,411 | 44 | 1 | 81.3 | 1.8 |
| Alger | 1,348 | 34 | 1 | 252.2 | 7.4 |
| Allegan | 39,129 | 53 | 1 | 13.5 | 2.6 |
| Alpena | 17,182 | 47 | 5 | 27.4 | 2.9 |
| Antrim | 11,924 | 14 | 0 | 11.7 | 0 |
| Arenac | 6,627 | 0 | 0 | 0 | 0 |
| Baraga | 3,933 | 0 | 0 | 0 | 0 |
| Barry | 23,720 | 17 | 0 | 7.2 | 0 |
| Bay | 60,072 | 136 | 13 | 22.6 | 2.2 |
| Benzie | 7,354 | 15 | 4 | 20.5 | 5.5 |
| Berrien | 44,542 | 93 | 8 | 20.9 | 1.8 |
| Branch | 26,351 | 164 | 5 | 62.2 | 1.9 |
| Calhoun | 46,479 | 59 | 4 | 12.7 | 0.9 |
| Cass | 21,120 | 29 | 3 | 13.7 | 1.4 |
| Charlevoix | 10,620 | 21 | 1 | 19.8 | 0.9 |
| Cheboygan | 13,419 | 16 | 2 | 11.9 | 1.5 |
| Chippewa | 14,494 | 6 | 1 | 4.1 | 0.7 |
| Clare | 7,871 | 41 | 3 | 52.1 | 3.8 |
| Clinton | 26,324 | 72 | 1 | 27.4 | 0.4 |
| Crawford | 2,773 | 0 | 0 | 0 | 0 |
| Delta | 18,277 | 6 | 2 | 3.3 | 1.1 |
| Dickinson | 14,774 | 54 | 3 | 36.6 | 2.0 |
| Eaton | 32,483 | 117 | 3 | 36.0 | 0.9 |
| Emmet | 9,975 | 15 | 0 | 15.0 | 0 |
| Genesee | 40,272 | 146 | 1 | 36.3 | 0.2 |
| Gladwin | 4,727 | 12 | 3 | 25.4 | 6.4 |
| Gogebic | 13,854 | 88 | 14 | 63.5 | 10.1 |
| Gd. Traverse | 16,474 | 20 | 2 | 12.1 | 1.2 |
| Gratiot | 28,745 | 28 | 1 | 9.7 | 0.3 |
| Hillsdale | 30,368 | 21 | 0 | 6.9 | 0 |
| Houghton | 41,978 | 277 | 28 | 66.0 | 6.7 |
| Huron | 31,323 | 10 | 1 | 3.2 | 0.3 |
| Ingham | 39,183 | 86 | 7 | 21.9 | 1.8 |
| Ionia | 34,313 | 125 | 1 | 36.4 | 0.3 |
| Iosco | 13,060 | 3 | 1 | 2.3 | 0.8 |
| Iron | 4,974 | 2 | 0 | 4.0 | 0 |
| Isabella | 20,775 | 8 | 0 | 3.9 | 0 |
| Isle Royal | .......... | 0 | 0 | 0 | 0 |
| Jackson | 46,158 | 224 | 9 | 48.5 | 2.0 |
| Kalamazoo | 41,360 | 108 | 5 | 26.1 | 1.2 |
| Kalkaska | 5,518 | 16 | 0 | 29.0 | 0 |
| Kent | 118,920 | 324 | 15 | 37.3 | 1.3 |
| Keweenaw | 2,827 | 0 | 0 | 0 | 0 |
| Lake | 6,048 | 110 | 13 | 181.9 | 21.5 |
| Lapeer | 28,959 | 194 | 5 | 67.0 | 1.7 |
| Leelanaw | 9,032 | 3 | 0 | 3.3 | 0 |
| Lenawee | 48,518 | 211 | 4 | 43.5 | 0.8 |
| Livingston | 20,541 | 71 | 3 | 34.5 | 1.5 |
| Luce | 2,375 | 0 | 0 | 0 | 0 |
| Mackinac | 7,385 | 54 | 9 | 73.1 | 12.2 |
| Macomb | 32,240 | 92 | 5 | 28.5 | 1.6 |
| Manistee | 25,642 | 36 | 5 | 14.0 | 1.9 |
| Manitou | 903 | 0 | 0 | 0 | 0 |
| Marquette | 38,004 | 311 | 5 | 81.8 | 1.3 |
| Mason | 17,910 | 59 | 5 | 32.9 | 2.8 |
| Mecosta | 20,472 | 78 | 9 | 38.1 | 4.4 |
| Menominee | 22,945 | 86 | 9 | 37.5 | 3.9 |
| Midland | 12,582 | 0 | 0 | 0 | 0 |
| Missaukee | 6,479 | 14 | 3 | 21.6 | 4.6 |
| Monroe | 32,969 | 35 | 3 | 10.6 | 0.9 |
| Montcalm | 33,776 | 39 | 2 | 11.5 | 0.6 |
| Montmorency | 2,198 | 4 | 0 | 18.2 | 0 |
| Muskegon | 37,996 | 20 | 1 | 5.3 | 0.3 |
| Newaygo | 19,462 | 17 | 1 | 8.7 | 0.5 |
| Oakland | 42,312 | 135 | 3 | 31.9 | 0.7 |
| Oceana | 16,372 | 30 | 2 | 18.3 | 1.2 |
| Ogemaw | 5,623 | 3 | 0 | 5.3 | 0 |
| Ontonagon | 6,094 | 0 | 0 | 0 | 0 |
| Osceola | 16,014 | 166 | 13 | 103.7 | 8.1 |
| Oscoda | 1,829 | 0 | 0 | 0 | 0 |
| Otsego | 4,664 | 30 | 11 | 64.3 | 23.6 |
| Ottawa | 38,146 | 59 | 0 | 15.5 | 0 |
| Presque Isle | 5,604 | 7 | 0 | 12.5 | 0 |
| Roscommon | 1,751 | 1 | 1 | 5.7 | 5.7 |
| Saginaw | 81,949 | 239 | 32 | 29.2 | 3.9 |
| Sanilac | 33,605 | 0 | 0 | 0 | 0 |
| Schoolcraft | 6,800 | 4 | 0 | 5.9 | 0 |
| Shiawassee | 32,358 | 91 | 1 | 28.1 | 0.3 |
| St. Clair | 53,763 | 76 | 5 | 14.1 | 0.9 |
| St. Joseph | 25,154 | 81 | 3 | 32.2 | 1.2 |
| Tuscola | 33,965 | 107 | 1 | 31.5 | 0.3 |
| Van Buren | 30,930 | 52 | 5 | 16.8 | 1.6 |
| Washtenaw | 43,171 | 84 | 1 | 19.5 | 0.2 |
| Wayne | 283,650 | 740 | 89 | 26.1 | 3.1 |
| Wexford | 13,355 | 175 | 17 | 131.0 | 12.7 |

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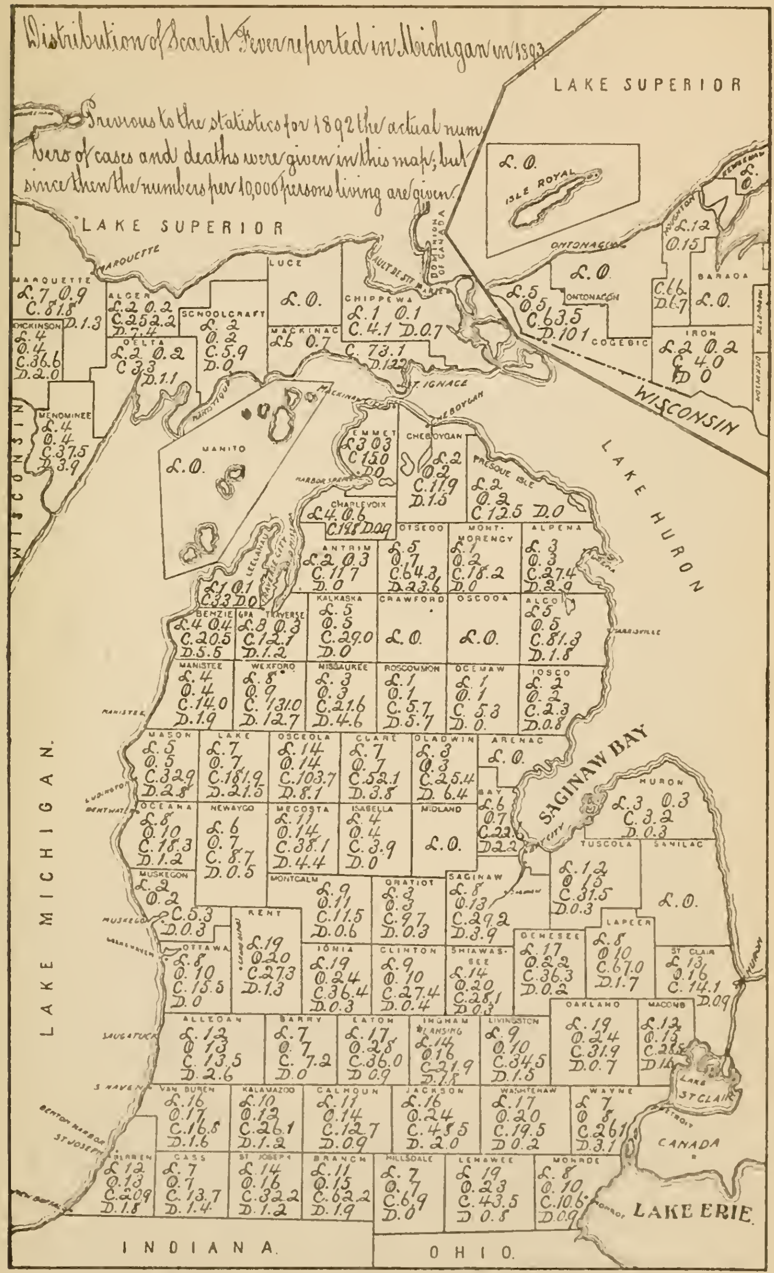
* By Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan "State Department."

DISTRIBUTION OF SCARLET FEVER IN MICHIGAN IN 1893.
BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.



Distribution of Scarlet Fever reported in Michigan in 1893

Previous to the statistics for 1892 the actual numbers of cases and deaths were given in this map; but since then the numbers per 10,000 persons living are given.

LAKE SUPERIOR
LAKE SUPERIOR
ISLE ROYAL L. O.
KEWEENAW L. O.
HOUGHTON L.12 O.15
BARAGA L. O.
C.66 D.6.7
ONTONAGON L. O.
L.5 O.5 C.63.5 D.101
GOGEBIC
IRON L.2 O.2 C.4.0 D 0
WISCONSIN
MARQUETTE L.7 O.9 C.81.8 D.1.3
ALGER L.2 O.2 C.252.2 D.7.4
SCHOOLCRAFT L. 2 O. 2 C.5.9 D.0
LUCE L. O.
CHIPPEWA L.1 O.1 C.4.1 D.0.7
MACKINAC L6 O.7 C. 73.1 D.122
DICKINSON L.4 O.4 C.36.6 D.2.0
DELTA L.2 O.2 C 3.3 D.1.1
MENOMINEE L.4 O.4 C.37.5 D.3.9
MANITO L. O.
ST. IGNACE
EMMET L.3 O.3 C 15.0 D.O
CHEBOYGAN L.2 O.2 C.11.9 D.1.5
PRESQUE ISLE L.2 O.2 C 12.5 D.O
CHARLEVOIX L.4. O.6 C.19.8 D.0.9
ANTRIM L.2 O.3 C.11.7 D.0
OTSEGO L.5 O.7 C.64.3 D.23.6
MONTMORENCY L.1 O.2 C.18.2 D.0
ALPENA L.3 O.3 C.27.4 D.2.9
LEELANAW L.1 O.1 C.3.3 D.0
BENZIE L.4 O.4 C.20.5 D.5.5
GD. TRAVERSE L.8 O.3 C.12.1 D.1.2
KALKASKA L.5 O.5 C.29.0 D.0
CRAWFORD L. O.
OSCODA L. O.
ALCONA L.5 O.5 C.81.3 D.1.8
MANISTEE L.4 O.4 C.14.0 D.1.9
WEXFORD L.8 O.9 C.131.0 D.12.7
MISSAUKEE L.3 O.3 C.21.6 D.4.6
ROSCOMMON L.1 O.1 C.5.7 D.5.7
OGEMAW L.1 O.1 C 5.3 D.0.
IOSCO L.2 O.2 C.2.3 D.0.8
LAKE HURON
SAGINAW BAY
MASON L.5 O.5 C.32.9 D.2.8
LAKE L.7 O.7 C.181.9 D.21.5
OSCEOLA L.14 O.14 C.103.7 D.8.1
CLARE L.7 O.7 C.52.1 D.3.8
GLADWIN L.3 O.3 C.25.4 D.6.4
ARENAC L. O.
BAY L.6 O.7 C.22.6 D2.2
HURON L.3 O.3 C.3.2 D.0.3
OCEANA L.8 O.10 C.18.3 D.1.2
NEWAYGO L.6 O.7 C.8.7 D.0.5
MECOSTA L.11 O.14 C.38.1 D.4.4
ISABELLA L.4 O.4 C.3.9 D.0
MIDLAND L. O.
TUSCOLA L.12 O.15 C.31.5 D.0.3
SANILAC L. O.
MUSKEGON L.2 O.2 C.5.3 D.0.3
MONTCALM L.9 O.11 C.11.5 D.0.6
GRATIOT L.3 O.3 C.9.7 D.0.3
SAGINAW L.8 O.13 C.29.2 D.3.9
GENESEE L.17 O.22 C.36.3 D.0.2
LAPEER L.8 O.10 C.67.0 D.1.7
OTTAWA L.8 O.10 C.15.5 D.0
KENT L.19 O.20 C.27.3 D.1.3
IONIA L.19 O.24 C.36.4 D.0.3
CLINTON L.9 O.10 C.27.4 D.0.4
SHIAWASSEE L.14 O.20 C.28.1 D.0.3
ST CLAIR L.13 O.16 C.14.1 D.0.9
ALLEGAN L.12 O.13 C.13.5 D.2.6
BARRY L.7 O.7 C.7.2 D.0
EATON L.17 O.28 C.36.0 D 0.9
INGHAM LANSING L.14 O.16 C.21.9 D.7.8
LIVINGSTON L.9 O.10 C.34.5 D.1.5
OAKLAND L.19 O.24 C.31.9 D.0.7
MACOMB L.12 O.13 C.28.5 D.1.6
LAKE MICHIGAN
VAN BUREN L.16 O.17 C.16.8 D.1.6
KALAMAZOO L.10 O.12 C.26.1 D.1.2
CALHOUN L.11 O.14 C.12.7 D.0.9
JACKSON L.16 O.24 C.45.5 D.2.0
WASHTENAW L.17 O.20 C.19.5 D 0.2
WAYNE L.7 O.8 C.261 D.3.1
LAKE ST CLAIR
CANADA
BERRIEN L.12 O.13 C.20.9 D.1.8
CASS L.7 O.7 C.13.7 D.1.4
ST JOSEPH L.14 O.16 C.32.2 D.1.2
BRANCH L.11 O.15 C.62.2 D.1.9
HILLSDALE L.7 O.7 C.6.9 D.0
LENAWEE L.19 O.23 C.43.5 D 0.8
MONROE L.8 O.10 C.10.6 D.0.9
LAKE ERIE
INDIANA.
OHIO.

L.= Localities; O.= Outbreaks; C.= Cases per 10,000 population, D.= Deaths per 10,000 population.
[PLATE-776.]

TABLE 2.—*Exhibiting the Estimated Population of Michigan for the year 1893, by tiers of counties (Upper Peninsula as one tier); also the number of cases of Scarlet Fever* REPORTED *from each of these divisions for 1893, and the number of cases per 10,000 estimated population of each division.*

| Counties in Groups, most Northern ones First. | | Estimated Population, 1893.* | Reported Cases of Scarlet Fever, 1893. | Reported Cases per 10,000 of Population. |
|---|---|---|---|---|
| State | | 2,204,563 | 6,065 | 27.5 |
| Upper Peninsula | Alger. Mackinac. Houghton. Marquette.<br>Delta. Chippewa. Ontonagon. Iron.<br>Schoolcraft. Isle Royal. Gogebic. Menominee.<br>Luce. Keweenaw. Baraga. Dickinson. | 200,062 | 922 | 46.1 |
| Eleventh tier of counties | Manitou.<br>Emmet. Cheboygan.<br>Charlevoix. Presque Isle. | 40,521 | 59 | 14.6 |
| Tenth tier of counties | Leelanaw.<br>Antrim.<br>Otsego. Alpena.<br>Montmorency. | 45,000 | 98 | 21.8 |
| Ninth tier of counties | Benzie. Crawford.<br>G'd Traverse. Oscoda.<br>Kalkaska. Alcona. | 39,359 | 95 | 24.1 |
| Eighth tier of counties | Manistee.<br>Wexford. Ogemaw.<br>Missaukee. Iosco.<br>Roscommon. | 65,910 | 232 | 35.2 |
| Seventh tier of counties | Mason. Gladwin.<br>Lake. Bay.<br>Osceola. Huron.<br>Clare. Arenac. | 150,592 | 534 | 35.5 |
| Sixth tier of counties | Oceana.<br>Newaygo. Midland.<br>Mecosta.<br>Isabella. | 89,663 | 133 | 14.8 |
| Fifth tier of counties | Muskegon.<br>Montcalm. Tuscola.<br>Gratiot. Sanilac.<br>Saginaw. | 250,006 | 433 | 17.3 |
| Fourth tier of counties | Ottawa. Shiawassee.<br>Kent. Genesee.<br>Ionia. Lapeer.<br>Clinton. St. Clair. | 373,055 | 1,087 | 29.1 |
| Third tier of counties | Allegan.<br>Barry. Livingston.<br>Eaton. Oakland.<br>Ingham Macomb. | 229,608 | 571 | 24.9 |
| Second tier of counties | Van Buren.<br>Kalamazoo. Washtenaw.<br>Calhoun. Wayne.<br>Jackson. | 491,743 | 1,267 | 25.7 |
| First tier of counties | Berrien.<br>Cass. Hillsdale.<br>St. Joseph. Lenawee.<br>Branch. Monroe. | 229,022 | 634 | 27.7 |

* By Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan, "State Department." Estimate by arithmetical method, based on the United States census of 1890, and the State census of 1894.—"Vital Statistics," 1893, pp. 17-19.

Table 2 exhibits the latitudinal distribution of scarlet fever throughout the State, by tiers of counties; all the counties of the Upper Peninsula considered as one tier. By this table (2), it appears that the lowest sickness-rate (14.6 per 10,000 of population) was in the eleventh tier of counties; and that the sixth and fifth tiers of counties were next in lowest sickness-rates, they being respectively, 14.8 and 17.3 per 10,000 of population. The tier of counties having the greatest sickness-rate (46.1 per 10,000 of population) was the extreme north tier, and the seventh tier with 35.5, and the eighth with 35.2 cases per 10,000 of population were largely above the average of sickness-rate for the State.

The sickness-rate in the second tier of counties, as may be seen in the table, was 25.7 cases per 10,000 of population. In the city of Detroit, situated in this tier, the rate was 30.8 per 10,000, and in this tier excluding Detroit, the rate was 21.4 per 10,000. In the fourth tier of counties, in which is situated the city of Grand Rapids, the sickness-rate was 29.1 per 10,000 of population. In the city of Grand Rapids the rate was 35.6, and in the tier of counties excluding Grand Rapids it was 27.5 cases per 10,000 of population.

SCARLET FEVER IN 1893 COMPARED WITH PREVIOUS YEARS.

TABLE 3.—*Exhibiting the numbers of outbreaks, cases and deaths from Scarlet Fever, together with the average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, reported to the office of the State Board of Health for each of the 12 years, 1882–93; with the departure of the same for 1893, from 1892, and from the average of the same for the 9 years, 1884–92.*

| Year. | Reported Outbreaks. | Reported Localities. | Reported Cases. | Av. No. of Cases per Outbreak. | Reported Deaths. | Av. No. of Deaths per Outbreak. | Deaths per 100 Cases. |
|---|---|---|---|---|---|---|---|
| 1882 | ............ | 83 | 849 | ............ | 138 | ............ | *16.0 |
| 1883† | 164 | 150 | 1,802 | 11. | 248 | 1.51 | *14.0 |
| 1884‡ | 324 | 296 | 2,476 | 8. | 230 | .71 | 9.0 |
| 1885 | 356 | 337 | 2,750 | 8. | 187 | .53 | 7.0 |
| 1886 | 388 | 302 | 3,046 | 8.28 | 275 | .71 | 9.0 |
| 1887 | 353 | 297 | 3,400 | 9.63 | 314 | .89 | 9.0 |
| 1888 | 381 | 315 | 2,989 | 7.85 | 200 | .52 | 6.7 |
| 1889 | 421 | 382 | 3,535 | 8.40 | 166 | .39 | 4.6 |
| 1890 | 481 | 417 | 3,835 | 7.97 | 162 | .34 | 4.2 |
| 1891 | 605 | 516 | 2,212 | 10.27 | 286 | .47 | 4.6 |
| 1892 | 625 | 548 | 7,075 | 11.32 | 487 | .78 | 6.9 |
| 1893 | 675 | 566 | 6,065 | 8.99 | 415 | .61 | 6.8 |
| Average for nine years, 1884-1892 | 437 | 379 | 3,924 | 8.86 | 256 | .59 | 6.8 |
| Departure of 1893 from 1892 | +50 | +18 | −1,010 | −2.33 | −72 | −.17 | −.1 |
| Departure of 1893 from the average for 9 years, 1884-92 | +238 | +187 | +2,141 | +.13 | +159 | +.02 | = |

* Probably in some instances only the fatal cases were reported.

† Use of the blank form "M" for weekly reports was begun in May, 1883.

‡ Use of the annual reports of health officers in compiling scarlet fever for the communicable disease article was begun in 1884.

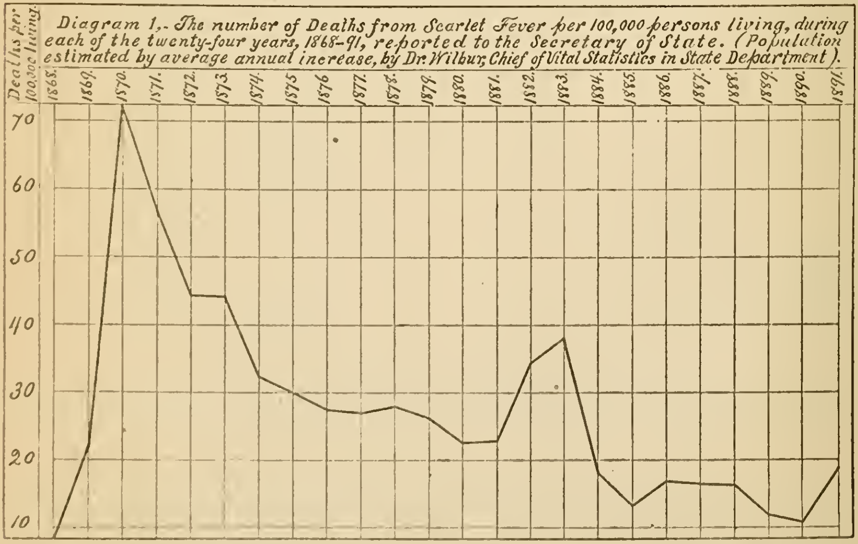
Comparisons with previous years, to ascertain the comparative increase or decrease of prevalence of this disease in the State, would no doubt be interesting and instructive if there existed a fixed basis on which to found such comparisons; but from year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports; and in the efforts made by local health authorities throughout the State to supply in their reports the information desired by the State Board. It is therefore still impossible to determine the exact increase or decrease of prevalence of the disease in the State by comparison of the numbers of outbreaks of the disease, and the cases and deaths resulting therefrom, reported to this office year by year; and this fact should be borne in mind in referring to Table 3.

The following table (No. 4), giving the number of deaths from scarlet fever, per 100,000 persons living, reported to the Secretary of State, probably more accurately represents the annual fluctuations of, but not the total deaths from scarlet fever in Michigan during the 26 years, 1868–93. The diagram (No. 1) printed on this page graphically represents the same data, with the exception of those for the years 1892 and 1893.

TABLE 4.—*Exhibiting the death rate from Scarlet Fever reported in Michigan, per 100,000 of population, for each of the 26 years, 1868–93. (The data for this table were supplied by C. L. Wilbur, M. D., Chief of Vital Statistics of Michigan, Department of the Secretary of State.)*

| Year. | 1868. | 1869. | 1870. | 1871. | 1872. | 1873. | 1874. | 1875. | 1876. | 1877. | 1878. | 1879. | 1880. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Death rate | 8.48 | 22.09 | 71.96 | 56. 62 | 44.33 | 43.94 | 32.23 | 29.99 | 27.41 | 26.91 | 27.74 | 26.26 | 22.66 |
| **Year.** | **1881.** | **1882.** | **1883.** | **1884.** | **1885.** | **1886.** | **1887.** | **1888.** | **1889.** | **1890.** | **1891.** | **1892.** | **1893.** |
| Death rate | 22.82 | 34.25 | 37.94 | 17.91 | 13.13 | 16.69 | 16.25 | 16.13 | 11.72 | 10.60 | 18.70 | 20.23 | 16.3 |

*Reported Deaths from Scarlet fever in Michigan, 24 Years, 1868-91.*



NUMBER OF OUTBREAKS OF SCARLET FEVER IN EACH MONTH OF THE YEAR, 1893.

The last line of figures in table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 158 more beginnings than endings of outbreaks reported during the year 1893.

TABLE 5.—*Exhibiting the reported number of outbreaks of Scarlet Fever which Began, the number which Ended, and the number of outbreaks which were Present, in each Month of the Year 1893, in the different local jurisdictions of Michigan.*

| Outbreaks. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number began | 145 | 46 | 51 | 51 | 53 | 31 | 35 | 40 | 39 | 45 | 57 | 43 | 636 |
| Number ended | 25 | 35 | 39 | 38 | 42 | 38 | 31 | 34 | 31 | 25 | 42 | 98 | 478 |
| Number present | 151 | 145 | 153 | 154 | 157 | 140 | 126 | 133 | 131 | 138 | 165 | 156 | ...... |

TABLE 6.—*Exhibiting the Number and Per Cent of cases of Scarlet Fever in Michigan in each Month during the Year 1893. (Includes each case for which the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of cases sick in any part of the month | 800 | 616 | 587 | 584 | 613 | 594 | 457 | 464 | 426 | 540 | 637 | 620 |
| Per cent the cases sick in each month were of total reported cases | 13 | 10 | 8 | 9 | 10 | 9 | 7 | 7 | 7 | 8 | 10 | 10 |

The first line of figures, in table 6, shows the number of cases reported sick in any part of each month.

As some of the cases were sick longer than one month they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1893; and the sum of the last line of figures in Table 6 exceeds 100.

The last line of figures, in this table, shows the per cent the cases sick in each month are of the exact number of cases *reported* to this office for the year 1893.

### SOURCE OF CONTAGIUM OF SCARLET FEVER, HOW THE DISEASE IS SPREAD, AND THE VITALITY OF THE CONTAGIUM.

Of the 6,065 cases of scarlet fever reported during the year 1893, as exhibited in the following table, the local health officers reported the source of contagium as follows:—Traced to a former case, 937; probably traced to a former case, 22; carried in carpets and clothing, 19; attributed to meteorological conditions, 1; attributed to unsanitary conditions, 7; unknown, 1,610; not reported or indefinitely reported, 3,469; total, 6,065.

TABLE 7.—*Reported Source of Contagium of Cases of Scarlet Fever in 1893.*

| | Cases. |
|---|---|
| Traced to a former case | 937 |
| Probably to a former case | 22 |
| Carried in carpets and clothing | 19 |
| Meteorological conditions | 1 |
| Alleged unsanitary conditions | 7 |
| Unknown (including "Exposure," "Contagium," "Endemic" and "Sporadic" | 1,610 |
| Not reported or reports not definite | 3,469 |
| All cases | 6,065 |

### *Cases of Scarlet Fever Traced to a Former Case.*

Table 7 shows that of the 6,065 reported cases of scarlet fever in this State in 1893, 937 were reported traced to a former case and 22 probably traced to a former case of the disease. The following are extracts from a few of the reports in which the health officers so reported:—

"By immigration."—*J. C. McDermott, Burt township, Alger county.*

"It was contracted by one Wilks, at a lumber camp at some place removed from this locality, who came to his home sick. None of the thirteen cases were reported to me by any one, and I only knew of them after nearly all had recovered."—*Wm. D. Wylie, Jordan township, Antrim county.*

"A young lady came visiting to the district and gave it to the scholars in the Grove schoolhouse."—*C. H. Artz, M. D., Watertown township, Clinton County.*

"Traceable to a visit of a servant to a house where a child had scarlet fever, not in my jurisdiction."—*B. W. Jones, M. D., Norway township, Dickinson county.*

"Supposed to be by a letter received by a Mrs. Miles."—*J. S. Newland, M. D, Olivet village, Eaton county.*

"From an emigrant child, who was ill with the disease when he arrived here, and did not call a physician until several families had been infected."—*A. I. Lawbaugh, M. D., Osceola township, Houghton county.*

"Two children visiting family * * * who had but incompletely recovered from so called scarlet rash."—*Wm. Bell, M. D., Otisco township, Ionia county.*

"Contagium conveyed by a young man visiting the family when he was coming down with the disease."—*J. M. Rankin, M. D., Richland township, Kalamazoo county.*

"A very mild form of scarlatina has prevailed to a moderate extent for several months and persons not knowing they had the disease were occasionally found passing among the people."—*J. M. Rankin, M. D., Richland township, Kalamazoo county.*

"The first case originated in a family by the name of L——. The F—— child took it from there by the mother going to a funeral."—*C. M. Slawson, M. D., Spencer township, Kent county.*

"It is supposed that a minister, who was at that time holding services at the schoolhouse, * * * conveyed infection on his person. Had been among scarlet fever patients."—*E. I. Allen, M. D., Golden township, Oceana county.*

"The child's grandmother was buried ten days previous to the child being taken sick, and one of the friends had taken care of a child that had scarlet fever two months previous."—*Austin Trowbridge, Antrim township, Shiawassee county.*

"The father was at families where it existed and was supposed to have conveyed it in his clothes."—*F. P. Robertson, M. D., Breedsville village, Van Buren county.*

### *Source of Scarlet Fever Indefinite.*

The following extracts are taken from a few of the health officers' reports from which the source of contagium of cases is compiled under the head, "Indefinite."

"Contracted in sleeping car."—*Wallace J. Weeks, M. D., Hanover township, Jackson county.*

"Supposed from traveling on the cars."—*O. F. Burroughs, M. D., Comstock township, Kalamazoo county.*

"Contracted it on the train from Detroit here."—*M. W. Danforth, M. D., Cascade township, Kent county.*

"Traced to traveling. Played with children * * * having sore throat."—*R. M. Eccles, M. D., Blissfield township, Lenawee county.*

"By drinking water from a well that had not been used for years."—*J. W. Anderson, M. D., Troy township, Oakland county.*

"Unreported cases among the Poles."—*N. L. Parmater, M. D., Gaylord village, Otsego county.*

### *Duration of the Vitality of the Scarlet Fever Germ.*

The germ of scarlet fever is not yet demonstrated; but that there is a germ seems to be proved by the known communicability of the disease.

The following extracts from the reports of health officers and physicians indicate that the scarlet fever germ frequently retains its vitality for a long time outside of the human body, in an apparently dormant or inactive state, in houses, clothing, carpets, furniture, etc., and is then capable of developing scarlet fever in persons coming into such houses or in contact with or near such articles, thus showing the importance of carefully disinfecting all infected houses and articles, even where they are not to be used for a long time:—

"A child wearing clothing worn by a child one year before, who had died from scarlet fever."—*F. K. Timmerman, M. D., Hastings city, Barry county.*

"Do not know manner unless it was due to the contagium remaining in some old clothes. The first two children in the family had the disease about one year ago in the country, and old clothes doubtless were packed away." —*Geo. K. Shirton, M. D., Lake Ann village, Benzie county.*

"Infected clothing from those sick last fall."—*Geo. E. Ryerse, Hendricks township, Mackinac county.*

"Contracted from poison in old clothes, four years standing."—*Jas. E. Maxwell, M. D., Decatur township, Van Buren county.*

"About six months ago a family living in the house had scarlet fever. They moved out and this family moved in. Can only account for the infection in this way."—*Henrietta A. Carr, M. D., Eaton Rapids city, Eaton county.*

"About one year ago there was a case in one of these houses which was not reported. This spring another family moved in and contracted scarlet fever from that source, I believe. This house was not fumigated."—*F. S. Love, M. D., Vernon township, Shiawassee county.*

"Were probably traceable to a visit of Mr. B—— to Chicago where he slept in an unused room in which scarlet fever cases had lain sick the year before. He occupied this room one week, and a few days after his return his family and his neighbors came down with scarlatina. Case No. 10 was probably contracted in the house in Old Stronach, in which the family lived and where one or two children had died from scarlatina some time before."—*Jas. A. King, M. D., Manistee city, Manistee county.*

### *Scarlet Fever Traced to Infected Clothing, Houses, etc.*

In addition to the extracts given above the following extracts are from health officers' reports in which the contagium is traced to infected clothing, houses, etc.:—

"Carried in clothing."—*Wm. F. Bingham, Ovid township, Branch county.*

"From clothing."—*V. P. Fales, Leighton township, Allegan county.*

"From carpet in room."—*M. B. Coykendall, Albion township, Calhoun county.*

"From non-disinfected clothing from former cases."—*G. R. Wright, M. D., Pittsford township, Hillsdale county.*

"Mother took in washing from family that had scarlet fever."—*F. E. Wolfe, M. D., Metamora village, Lapeer county.*

"Carried in clothing."—*M. A. Gerome, M. D., Fairfield township, Lenawee county.*

"The father had been lecturing in a village in which they had scarlet fever and brought it home in his clothes."—*A. B. House, M. D., Memphis village, Macomb county.*

"From a house across the road where they had scarlet fever before and had not properly disinfected."—*E. M. Snyder, M. D., Sunfield township, Eaton county.*

"Think folks had a light case in family last fall and did not report or fumigate. These children came there and were taken in three days."—*Earl Fairbanks, M. D., Ellsworth township, Lake county.*

"Probably brought here through clothing from some other place. Large numbers of workmen and families are continuously on the wing along the line of the 'Soo' railroad."—*Michael Cassidy, Newton township, Mackinac county.*

### *Movements of Contagium af Scarlet Fever.*

The following Table (8) and Map, "Movements of Contagium," show the sources and direction of movements of scarlet fever in Michigan, where the contagium was reported by health officers to have been introduced into their jurisdictions from localities outside the State, or from other jurisdictions within the State.

TABLE 8.—*First, second and third Localities, where the second Locality was infected with Scarlet Fever from the first, and the third was infected from the second; and the numbers of Cases and Deaths from Scarlet Fever in the first, second and third Localities, with the date of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

| Number.† | First Localities from which Scarlet Fever spread. Locality. | Cases. | Deaths. | Second Localities Infected from First. Locality. | Cases. | Deaths. | Third Localities Infected from Second. Locality. | Cases. | Deaths. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Allegan county:<br>Allegan village<br>(April 2-April 12.) | 1 | 0 | Allegan county:<br>Casco township<br>(July 20-Dec. 14.) | 23 | 0 | | | |
| 2 | Alpena county:<br>Alpena city<br>(April 15-Dec. 26.) | 67 | 6 | Alcona county:<br>Harrisville village<br>(June 7-Dec. 12.) | 18 | 0 | | | |
| | | | | Tuscola county:<br>Gilford township<br>(July 15-Aug. 16.) | 9 | 0 | | | |
| 3 | Arenac county:<br>Standish township | * | .... | Bay county:<br>Pinconing village<br>(January.) | 1 | 0 | | | |
| 4 | Bay county:<br>Bay City | 114 | 10 | Genesee county:<br>Thetford township<br>(March 3-April 12.) | 7 | 0 | | | |
| 5 | Berrien county:<br>Benton Harbor city<br>(Jan. 7-April 20.) | 36 | 0 | Berrien county:<br>Benton township<br>(Dec. 1-Dec. 23.) | 3 | 0 | | | |
| | | | | Oronoko township<br>(Feb. 16-Mar. 5.) | 2 | 6 | | | |
| | | | | Watervliet township<br>(Sept. 11-Oct. 15.) | 6 | 0 | | | |
| 6 | Branch county:<br>Coldwater city<br>(Jan. 10-Dec. 18.) | 100 | 2 | Branch county:<br>Girard township<br>(Nov. 9-Dec. 16.) | 4 | 0 | | | |
| | | | | Union City village<br>(Feb. 7-Feb. 28.) | 3 | 0 | | | |
| 7 | Branch county:<br>Coldwater township | * | .... | St. Joseph county:<br>Mendon township<br>(April 8-May 6.) | 1 | 0 | | | |
| 8 | Branch county:<br>Noble township<br>(July 20-Dec. 20.) | 12 | 1 | St. Joseph county:<br>Burr Oak village<br>(Sept. 28-Oct. 13.) | 1 | 0 | | | |
| 9 | Charlevoix county:<br>Charlevoix village | 1 | 1 | Mecosta county:<br>Big Rapids city | 5 | 0 | | | |
| 10 | Charlevoix county:<br>Evangeline township | * | .... | Charlevoix county:<br>East Jordan village<br>(Mar. 13-Dec. 30.) | 11 | 0 | Antrim county:<br>Jordan township<br>(Oct. 25-Nov. 12.) | 1 | 0 |
| | | | | | | | Charlevoix county:<br>Wilson township<br>(April 1-April 10.) | 1 | 0 |
| 11 | Clare county:<br>Clare city | 1 | 0 | Clare county:<br>Grant township | 1 | 0 | | | |
| 12 | Clinton county:<br>Ovid village | * | .... | Genesee county:<br>Argentine township<br>(Feb. 22-Mar. 2.) | 1 | 0 | | | |

† The consecutive numbers in this column refer to similar consecutive numbers before quotations in the text following this table.

* Scarlet Fever was not reported to this Office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the locality from which the disease is reported to have spread.

TABLE 8.—CONTINUED.—*Movement of Contagium or Infection.*

| Number.† | First Localities from which Scarlet Fever spread. | | | Second Localities Infected from first. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 13 | Eaton county:<br>Charlotte city<br>(Jan. —Feb. —.) | 7 | 1 | Eaton county:<br>Potterville village<br>(Jan. 4–Jan. —.) | 2 | 1 | | | |
| 14 | Eaton county:<br>Vermontville village<br>(Jan. 20–April 15.) | 10 | 1 | Barry county:<br>Nashville village<br>(Feb. 18–Mar. 7.) | 4 | 0 | | | |
| 15 | Emmet county:<br>Petoskey village<br>(May 9–Jan. 1.) | 10 | 0 | Antrim county:<br>Banks township<br>(Dec. 30–Jan. 16) | 1 | 0 | | | |
| 16 | Genesee county:<br>Fenton village | 3 | 0 | Livingston county:<br>Deerfield township | 17 | 1 | | | |
| 17 | Genesee county:<br>Flint city | 25 | 0 | Shiawassee county:<br>Antrim township | 4 | 0 | | | |
| 18 | Genesee county:<br>Flushing village | * | --- | Genesee county:<br>Clayton township<br>(Jan. 29.) | 12 | 0 | | | |
| 19 | Genesee county:<br>Gaines township | 2 | 0 | Genesee county:<br>Argentine township | 5 | 0 | | | |
| 20 | Genesee county:<br>Montrose township | 1 | 1 | Shiawassee county:<br>Caledonia township | 9 | 0 | | | |
| 21 | Gladwin county:<br>Beaverton township | * | ---- | Gladwin county:<br>Grout township<br>(April 29–May 20.) | 6 | 3 | | | |
| 22 | Gladwin county: | ---- | ---- | Clare county:<br>Hatton township<br>(Sept.—Dec.) | 10 | 1 | Clare county:<br>Arthur township<br>(Sept. —.) | 16 | 1 |
| 23 | Gogebic county:<br>Ironwood city | 71 | 14 | Gogebic county:<br>Bessemer city<br>(Feb. 12–Oct. 11.) | 11 | 0 | | | |
| | | | | Bessemer township<br>(Feb. 12–Mar. 28.) | 3 | 0 | | | |
| 24 | Grand Traverse county:<br>Traverse city village<br>(July 8–Dec. —.) | 14 | 2 | Leelanaw county:<br>Empire township<br>(Nov. 28–Dec. 10.) | 3 | 0 | | | |
| 25 | Houghton county:<br>Houghton village<br>(July 20–Aug. 2.) | 1 | 0 | Houghton county:<br>Chassell township<br>(Nov.—Dec. 20.) | 2 | 0 | | | |
| 26 | Ingham county:<br>Lansing city<br>(July 22–Nov. 11) | 13 | 3 | Eaton county:<br>Delta township<br>(July 23–Aug. 9.) | 5 | 0 | | | |
| 27 | Ingham county:<br>Leslie village<br>(Jan. 28.) | 3 | 0 | Ingham county:<br>Aurelius township<br>(Mar. 21–April 22.) | 7 | 1 | | | |
| 28 | Ingham county:<br>Mason city<br>(July–July 26.) | 2 | 0 | Ingham county:<br>Aurelius township<br>(Aug. 19 —.) | 1 | 0 | | | |
| 29 | Ingham county | ---- | ---- | Eaton county:<br>Windsor township<br>(Sept. 19–Sept. 28.) | 1 | 0 | | | |
| 30 | Ionia county:<br>Belding city<br>(Feb. 9.) | 11 | 0 | Montcalm county:<br>Greenville city<br>(Mar. 1–Jan.) | 9 | 0 | | | |

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TABLE 8.—CONTINUED.—*Movement of Contagium or Infection.*

| Number.† | First Localities from which Scarlet Fever spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 31 | Ionia county:<br>Keene township<br>(Aug.-Sept.) | 3 | 0 | Ionia county:<br>Saranac village<br>(Aug. 31-Oct. 12.) | 3 | 0 | | | |
| 32 | Isabella county:<br>Wise township<br>(Oct. 29-Dec. 15.) | 4 | 0 | Isabella county:<br>Denver township<br>(Nov. 2-Nov. 17.) | 2 | 0 | | | |
| 33 | Jackson county:<br>Henrietta township | 9 | 0 | Jackson county:<br>Rives township | 3 | 0 | | | |
| 34 | Jackson county:<br>Jackson city<br>(Jan. 9-Dec. 19) | 121 | 7 | Jackson county:<br>Rives township<br>(Aug. 15 —.) | 9 | 0 | | | |
| | | | | Spring Arbor twp.<br>(April 6-May 7.) | 1 | 0 | Jackson county:<br>Hanover Township | 5 | 0 |
| | | | | Ingham county:<br>Vevay township<br>(June-July.) | 5 | 0 | | | |
| 35 | Jackson county:<br>Parma township | * | .... | Jackson county:<br>Spring Arbor twp.<br>(Dec. 8-Dec. 11.) | 1 | 1 | | | |
| 36 | Kent county:<br>Grand Rapids city<br>(Jan. 8-Dec. 28.) | 266 | 12 | Emmet county:<br>Littlefield township<br>(Sept. 12-Sept 25.) | 4 | 0 | | | |
| | | | | Ionia county:<br>Odessa township<br>(July 27-Aug. 12.) | 2 | 0 | | | |
| | | | | Kalamazoo county:<br>Richland village<br>(Feb. 28-May 25.) | 2 | 0 | | | |
| | | | | Kent county:<br>Plainfield township<br>(Nov.-Dec. 23.) | 8 | 0 | Kent county:<br>Rockford village<br>(Nov. 19-Mar. 7.) | 8 | 0 |
| | | | | Tyrone township<br>(May 9.) | 1 | 0 | | | |
| | | | | Van Buren county:<br>Decatur township<br>(Dec. 7-Jan. 6.) | 1 | 0 | | | |
| 37 | Kent county:<br>Byron township<br>(May 19-June 13.) | 3 | 0 | Kent county:<br>Gaines township<br>(May 19-May 27.) | 2 | 0 | | | |
| 38 | Kent county: | .... | -- | Oceana county:<br>Elbridge township<br>(Feb. 26-May 25.) | 12 | 0 | | | |
| 39 | Lake county:<br>Baldwin village<br>(May 28-Aug. 15.) | 16 | 1 | Benzie county:<br>Inland township<br>(June 20-June 23.) | 1 | 1 | | | |
| 40 | Lapeer county:<br>Dryden village<br>(Jan.-May.) | 25 | 0 | Lapeer county:<br>Almont township<br>(Jan. 1-Mar. 20.) | 4 | 0 | | | |
| | | | | Dryden township<br>(Jan. 7-Dec.) | 100 | 0 | Lapeer county:<br>Metamora township<br>(Dec.-Jan.) | 6 | 0 |
| | | | | Oakland county:<br>Oxford township<br>(Mar. 26.) | 1 | 0 | | | |

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TABLE 8.—CONTINUED.—*Movement of Contagium or Infection.*

| Number.† | First Localities from which Scarlet Fever spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 41 | Lenawee county:<br>Adrian city<br>(Feb. 14-Dec. 28.) | 118 | 0 | Lenawee county:<br>Dover township<br>(Feb. 28-Apr. 5.) | 6 | 0 | | | |
| | | | | Ogden township<br>(Nov. 10-Nov. 24.) | 1 | 0 | | | |
| | | | | Rome township | 2 | 0 | | | |
| 42 | Livingston county:<br>Handy township | * | .... | Ingham county:<br>LeRoy township<br>(Aug. —— Sept.) | 4 | 0 | | | |
| 43 | Macomb county:<br>Armada village<br>(Aug. —— Jan.) | 12 | 0 | St. Clair county:<br>Riley township<br>(Oct. 1-Dec. 25.) | 2 | 0 | | | |
| 44 | Macomb county:<br>Warren township<br>(Jan. 9 ——.) | 4 | 1 | Macomb county:<br>Sterling township<br>(Jan. 20-Mar. 8.) | 3 | 1 | | | |
| 45 | Marquette county:<br>Marquette city<br>(Jan. —— Dec.) | 26 | 0 | Gogebic county:<br>Wakefield township<br>(Dec. 19-Jan. 6.) | 1 | 0 | | | |
| | | | | Mackinac county:<br>Holmes township<br>(Sept. 11-Jan. 10.) | 3 | 0 | | | |
| | | | | Mackinac Island<br>(Sept. 11-Jan. 6.) | 3 | 0 | | | |
| 46 | Marquette county:<br>Ishpeming city<br>(Jan. 3-Dec. 20.) | 243 | 5 | Marquette county:<br>Ely township<br>(Dec. —— Jan. 20.) | 1 | 0 | | | |
| 47 | Menominee county:<br>Menominee city<br>(May 6-Dec. 31.) | 73 | 7 | Dickinson county:<br>Norway city | 11 | 2 | Dickinson county:<br>Breitung township<br>(Apr. 27-May 14.) | 5 | 0 |
| | | | | Menominee county:<br>Mellen township<br>(Nov. 26.) | 1 | 0 | | | |
| 48 | Montcalm county:<br>Crystal township | * | .... | Montcalm county:<br>Ferris township<br>(May ——.) | 3 | 0 | | | |
| 49 | Oakland county:<br>Bloomfield township | 1 | 0 | Oakland county:<br>Troy township<br>(Apr. 14-Apr. 28.) | 1 | 0 | | | |
| 50 | Oceana county:<br>Grant township<br>(Mar. 13-Apr. 6) | 1 | 0 | Oceana county:<br>Shelby village<br>(Mar.) | 1 | 0 | | | |
| 51 | Ogemaw county:<br>Rose township | * | .... | Oakland county:<br>Waterford township<br>(July —— Aug.) | 2 | 1 | | | |
| 52 | Osceola county:<br>Burdell township<br>(Jan. ——.) | 18 | 0 | Lake county:<br>Dover township<br>Feb. 28-June 2.) | 2 | 1 | | | |
| 53 | Osceola county:<br>Evart village | 1 | 1 | Lake county:<br>Baldwin village<br>(May 28-Aug. 15.) | 16 | 1 | | | |
| | | | | Osceola county:<br>Sylvan township<br>(Jan. —— Feb.) | 12 | 0 | | | |

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TABLE 8.—CONTINUED.—*Movement of Contagium or Infection.*

| Number.† | First Localities from which Scarlet Fever spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 54 | Osceola county:<br>Hersey township | 1 | 1 | Mecosta county:<br>Grant township<br>(Dec. 15-Feb. 8.) | 2 | 0 | | | |
| 55 | Osceola county:<br>Middle Branch twp.<br>(Aug. 20-Dec. 15.) | 6 | 1 | Osceola county:<br>Hartwick township<br>(Sept. 11-Dec.) | 30 | 0 | | | |
| 56 | Osceola county:<br>Reed City village<br>(Apr. 6-Oct. 30.) | 26 | 6 | Mecosta county:<br>Green township<br>(Aug. 28-Aug.) | 2 | 2 | | | |
| | | | | Osceola county:<br>Lincoln township<br>(Mar. 25-Aug.) | 11 | 2 | | | |
| | | | | Richmond township<br>(June 3-Sept. 6.) | 28 | 2 | | | |
| 57 | Oscoda county:<br>Mentor township | * | .... | Montmorency county:<br>Albert township<br>(Mar. 19.) | 1 | 0 | | | |
| 58 | Otsego county:<br>Bagley township<br>(Aug. ——.) | 2 | 2 | Otsego county:<br>Dover township<br>(Oct. 23-Jan. 4.) | 10 | 3 | | | |
| 59 | Otsego county:<br>Gaylord village<br>(Nov. 1-Nov.) | 10 | 4 | Otsego county:<br>Elmira township<br>(Nov. 7-Nov.) | 2 | 0 | | | |
| 60 | Saginaw county:<br>Saginaw City<br>(Jan. 1-Dec. 31.) | 203 | 27 | Calhoun county:<br>Albion city<br>(Apr. 8-Nov. 15.) | 3 | 0 | | | |
| | | | | Saginaw county:<br>Birch Run<br>(July 13-Aug. 1.) | 4 | 0 | | | |
| 61 | Saginaw county | .... | .... | Shiawassee county:<br>Venice township<br>(Aug. 1-Jan.) | 10 | 0 | | | |
| | | | | Tuscola county:<br>Fair Grove township<br>Oct. 7-Nov.) | 2 | 0 | | | |
| 62 | Shiawassee county:<br>Laingsburg village<br>(Dec. 1-Dec. 21.) | 1 | 0 | Shiawassee county:<br>Sciota township<br>(Dec. 1-Dec. 21.) | 1 | 0 | Shiawassee county:<br>Woodhull township<br>(Dec. 16-Dec. 28.) | 6 | 0 |
| 63 | Shiawassee county:<br>Owosso city<br>(Aug. 17-Jan. 6.) | 34 | 0 | Shiawassee county:<br>Caledonia township<br>(Nov. 10-Dec. 5.) | 5 | 0 | | | |
| 64 | Shiawassee county:<br>Vernon village | 1 | 1 | Genesee county:<br>Linden village | 2 | 0 | | | |
| 65 | St. Clair county:<br>Port Huron city<br>(Jan. —— Dec.) | 31 | 1 | Lapeer county:<br>Attica township<br>(Jan. —— June 30.) | 25 | 4 | | | |
| | | | | St. Clair county:<br>Yale village<br>May 27-July 19.) | 2 | 0 | | | |
| 66 | St. Joseph county:<br>Nottawa township<br>(May 24-June 20.) | 7 | 1 | St. Joseph county:<br>Florence township<br>(May 27-June 5.) | 1 | 0 | | | |

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TABLE 8.—CONTINUED.—*Movement of Contagium or Infection.*

| Number.† | First Localities from which Scarlet Fever spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 67 | Tuscola county:<br>Akron village | * | ---- | Tuscola county:<br>Fair Grove township | 20 | 0 | Tuscola county:<br>Akron township | 36 | 0 |
| 68 | Washtenaw county:<br>Ann Arbor city | 1 | 0 | Shiawassee county:<br>Vernon village<br>(Nov. 8–Nov. 22.) | 1 | 1 | | | |
| | | | | Washtenaw county:<br>Lyndon township<br>Feb. 1–Feb. 5.) | 3 | 0 | | | |
| 69 | Washtenaw county:<br>Ypsilanti city<br>(Feb. ——.) | 12 | 0 | Livingston county:<br>Hamburg township<br>(Apr. 10.) | 1 | 0 | | | |
| 70 | Wayne county:<br>Detroit city<br>(Jan. 1–Dec. 31.) | 708 | 86 | Livingston county:<br>Cohoctah township<br>(June 3–June 15.) | 1 | 0 | | | |
| | | | | Macomb county:<br>Lenox township<br>(Oct. 30–Dec. 15.) | 23 | 1 | St. Clair county:<br>Casco township‡<br>(Nov. 28–Dec.) | 3 | 0 |
| | | | | Monroe county:<br>Monroe city<br>(Nov. 23 ——.) | 1 | 0 | | | |
| 71 | Wexford county:<br>Cadillac city | 141 | 16 | Osceola county:<br>Rose Lake township<br>(Mar. 20–June 24.) | 6 | 0 | | | |
| | | | | Wexford county:<br>Clam Lake township<br>(Sept. 6–Oct. 19.) | 9 | 1 | | | |
| 72 | South part of State | ---- | ---- | Gratiot county:<br>New Haven township<br>(Nov. 15–Jan 16.) | 14 | 0 | | | |
| | (*Movement of Infection* Into Michigan *from Outside the State.*) | | | | | | | | |
| 73 | Chicago | -- | -- | Cass county:<br>Vandalia village<br>(Jan 15–Feb. 25.) | 4 | 0 | | | |
| | | | | Eaton county:<br>Walton township<br>(Dec. 1–Dec. 25.) | 1 | 0 | | | |
| | | | | Kent county:<br>Lowell village<br>(Oct. 30–Nov. 16 ) | 1 | 0 | | | |
| 74 | Indiana:<br>Bristol | --- | ---- | St. Joseph county:<br>Constantine village<br>(Aug. 23–Oct. 10.) | 7 | 10 | | | |
| 75 | Indiana:<br>Butler | ---- | --- | St. Joseph county:<br>White Pigeon village<br>(Nov. 1–Dec. 29.) | 14 | 0 | | | |
| 76 | Iowa | -- | ---- | Calhoun county:<br>Albion township<br>(Oct. —— Oct.) | 2 | 0 | | | |
| 77 | Ontario | --- | ---- | Tuscola county:<br>Cass City village<br>(Jan. 25 ——.) | 1 | 0 | | | |

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‡ From Casco township to Macomb county, Richmond village, 7 cases.

TABLE 8.—CONCLUDED.—**Probable** *Movement of Contagium or Infection.*

| Number.† | First Localities from which Scarlet Fever spread. | | | Second Localities Infected from first. | | | Third Localities Infected from second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 78 | Allegan county:<br>Allegan village | 1 | 0 | Calhoun county:<br>Homer village | 3 | 0 | | | |
| 79 | Alpena county:<br>Alpena city | 67 | 6 | Alpena county:<br>Green township | 4 | 0 | | | |
| 80 | Ionia county:<br>Ionia city<br>(Jan. 13–May 10.) | 18 | 0 | Ionia county:<br>Muir village<br>(April 25–May 25.) | 3 | 0 | | | |
| 81 | Ronald township | 1 | 0 | Orleans township | 19 | 0 | | | |
| 82 | Jackson county:<br>Jackson city<br>(Jan. 3–Dec. 19.) | 121 | 7 | Hilsdale county:<br>Moscow township<br>(Oct. 11–Dec. 1.) | 2 | 0 | | | |
| | | | | Oakland county:<br>Commerce township<br>Sept. 24–Oct. 20.) | 3 | 1 | | | |
| 83 | Lenawee county:<br>Addison village | * | ---- | Hillsdale county:<br>Amboy township<br>(July–Nov.) | 5 | 0 | | | |
| 84 | Lenawee county:<br>Maddison township<br>(Oct. 1–Oct. 15.) | 2 | 2 | Lenawee county:<br>Fairfield township<br>(Oct. 20–Dec. 10.) | 4 | 0 | | | |
| 85 | Mecosta county:<br>Deerfield township<br>(Jan. 27–28.) | 12 | 1 | Mecosta county:<br>Morley village<br>(Jan.–Jan.) | 2 | 0 | | | |
| 86 | Montcalm county:<br>Lakeview village | * | ---- | Ionia county:<br>Boston township<br>(Jan.–Jan.) | 5 | 0 | | | |
| 87 | St. Clair county:<br>Riley township<br>Jan. 1–Feb. 18.) | 4 | 1 | Macomb county:<br>Memphis village<br>(Jan. ——.) | 3 | 0 | | | |
| 88 | Tuscola county:<br>Caro village | * | -- | Oakland county:<br>Addison township<br>(Jan. 18–May 27.) | 21 | 0 | | | |
| | | | | Tuscola county:<br>Gilford township<br>(Jan. 12–Jan. 19.) | 2 | 0 | | | |
| 89 | Washtenaw county:<br>Ypsilanti city<br>(Feb. ——.) | 12 | 0 | Oakland county:<br>Addison township<br>(Mar. 14–Mar. 30.) | 3 | 1 | | | |
| 90 | Wayne county:<br>Detroit city<br>(Jan. 1–Dec. 31.) | 708 | 86 | Washtenaw county:<br>Manchester village<br>(Jan. 20–May 15.) | 17 | 0 | | | |
| 91 | Wexford county:<br>Cadillac city<br>(Mar. 15–Aug. 4.) | 167 | 23 | Wexford county:<br>Colfax township<br>(July 9–July 26.) | 7 | 0 | | | |
| 92 | Chicago | ---- | ---- | Manistee county:<br>Copemish village<br>(Sept. 15–Sept. 27.) | 1 | 0 | | | |
| 93 | Iowa | ---- | ---- | Monroe county:<br>Whiteford township | 6 | 0 | | | |

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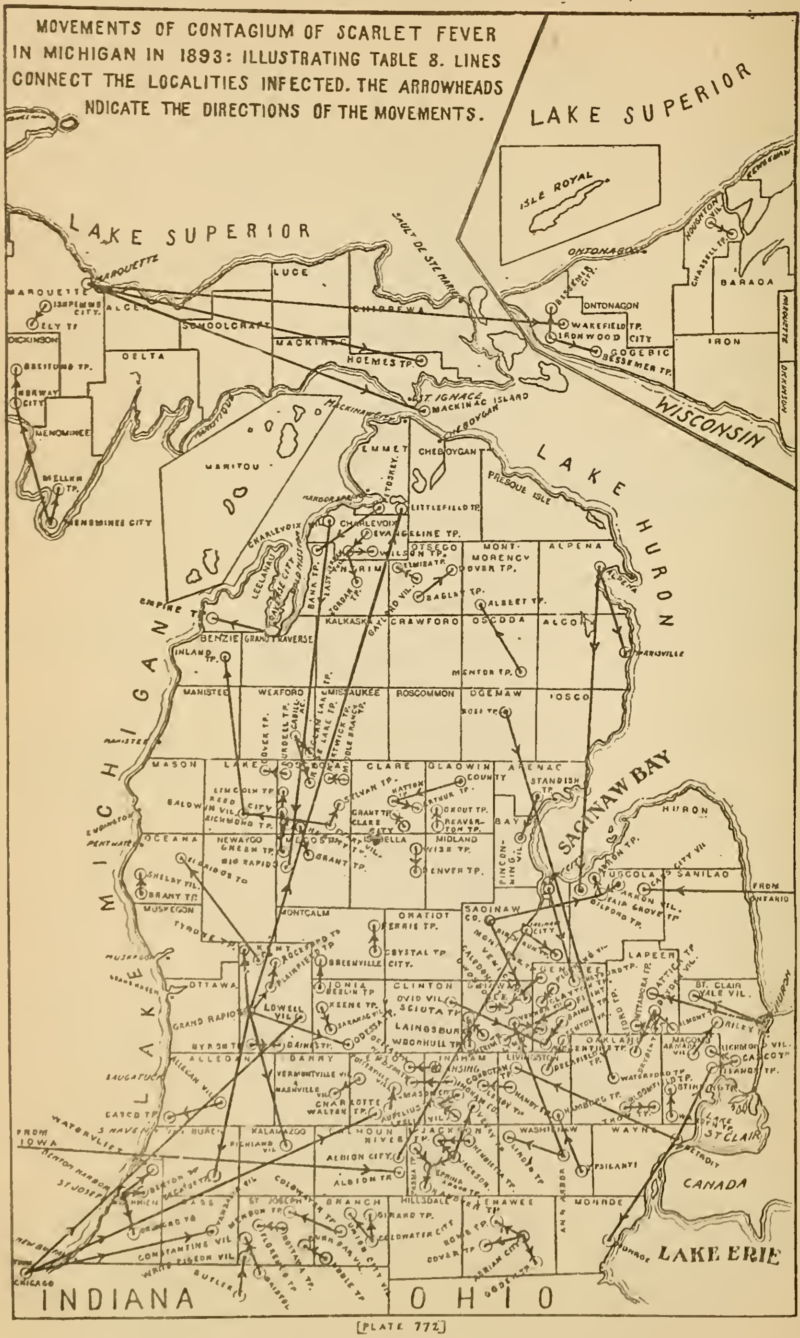
† The consecutive numbers in this column refer to similar consecutive numbers before quotations in the text following this table.

* Scarlet Fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the locality from which the disease is reported to have spread.

## MOVEMENTS OF CONTAGIUM OF SCARLET FEVER IN 1893.



MOVEMENTS OF CONTAGIUM OF SCARLET FEVER IN MICHIGAN IN 1893: ILLUSTRATING TABLE 8. LINES CONNECT THE LOCALITIES INFECTED. THE ARROWHEADS NDICATE THE DIRECTIONS OF THE MOVEMENTS.

[PLATE 772]

On the accompanying Map, the spread of scarlet fever in Michigan as reported to this office in the year, 1893, is shown by black lines which connect the localities; the arrow-head indicates the direction of the movement in each case. The source of this information is given in the following list of "extracts from reports of health officers," with the name and address of each health officer who traced the source of contagium in his jurisdiction, to some outside jurisdiction, or to some place outside of Michigan.

## *Outbreaks of Scarlet Fever Traced to a Former Case.*

The following are extracts from the reports of health officers who were able to trace the outbreaks of scarlet fever in their respective jurisdictions to cases of the disease outside their jurisdictions,—with the name of the health officer, and of the jurisdiction subjoined. These quotations concerning the spread of contagium from first to second, from second to third, and even to fourth localities, are arranged in the same order as the "First Localities" in the first column of Table 8, thus giving the source of each report. The consecutive numbers placed before these quotations refer to similar numbers in first column of Table 8 of this article.

1. "From Allegan."—*Albert Overhiser, Casco township, Allegan county.*

2. "Were all from a case from Alpena."—*David W. Mitchell, M. D., Harrisville village, Alcona county.*

2. "Friends visiting from Alpena."—*Joseph F. Malburg, Gilford township, Tuscola county.*

3. "From Standish township, Arenac county."—*W. B. Abbott, M. D., Pinconning village, Bay county.*

4. "Bay City."—*A. H. Coddington, Thetford township, Genesee county.*

6. "Taken at school in Benton Harbor."—*Lewis W. Buth, clerk, Benton township, Berrien county.*

5. "They had lately moved from Benton Harbor where they had the disease awhile before they moved from that place."—*Wm. F. Bullard, M. D., Oronoco township, Berrien county.*

5. "From Benton Harbor."—*W. L. Garratt, M. D., Watervliet township, Berrien county.*

6. "Exposure by a case in Coldwater City."—*James E. Perry, Girard township, Branch county.*

6. "Brought from Coldwater."—*E. H. Hurd, M. D., Union City village, Branch county.*

7. "The child was brought from the State School at Coldwater where she had been but a few days."—*Edwin Stewart, M. D., Mendon township, St. Joseph county.*

8. "At Noble township, Branch county."—*C. D. Parsons, M. D., Burr Oak village, St. Joseph county.*

9. "Brought from Charlevoix."—*C. P. Bigelow, M. D., Big Rapids City, Mecosta county.*

10. "At Bay Springs" (Evangeline township).—*F. A. Foster, M. D., East Jordan village, Charlevoix county.*

10. "Patient was attending school at East Jordan, Charlevoix county, when taken sick."—*Wm. D. Wylie, Jordan township, Antrim county.*

10. "By going to the village of East Jordan."—*John W. Isaman, Wilson township, Charlevoix county.*

11. "In the city of Clare."—*Irvin M. Miser, Grant township, Clare county.*

12. "Contracted in Ovid" (Clinton county).—*A. R. Ingram, M. D., Argentine township, Genesee county.*

13. "Was visiting in Charlotte, came here sick."—*E. R. Espie, M. D., Potterville village, Eaton county.*

14. "First two cases contracted disease at Vermontville; other case (being in the same family), took the disease from the first case."—*R. P. Comfort, M. D., Nashville village, Barry county.*

15. "Brought from Petoskey."—*Dempster H. Stebbins, Banks township, Antrim county.*

16. "From cases on the Fenton fair grounds."—*Wm. Harper, M. D., Deerfield township, Livingston county.*

17. "A family came from Flint on a visit with a child that had had scarlet fever the first part of the winter."—*Austin Trowbridge, Antrim township, Shiawassee county.*

18. "Contact at Flushing fair."—*A. B. Clark, M. D., Clayton township, Genesee county.*

19. "Brought by one who during the stage of desquamation came from the township of Gaines to visit the family in whose house this outbreak occurred."—*A. R. Ingram, M. D., Argentine township, Genesee county.*

20. "From Montrose township."—*Wm. Parker, Caledonia township, Shiawassee county.*

21. "It was contracted in the township of Beaverton, Gladwin county."—*B. W. Madill, Grant township, Gladwin county.*

22. "I think it was brought from Gladwin county. A lady came here visiting and her baby came down with what she claimed to be measles."—*W. C. Nowlen, Hatton township, Clare county.*

22. "It was introduced from the district of Hatton."—*Elias A. Kirvan, Arthur township, Clare county.*

23. "From Ironwood."—*Geo. D. Slocum, M. D., Bessemer City, Gogebic county.*

23. "From Ironwood."—*Geo. D. Slocum, M. D., Bessemer township, Gogebic county.*

24. "At Traverse City."—*L. H. Shank, M. D., Empire township, Leelanaw county.*

25. "Houghton."—*R. P. Smith, M. D., Chassell township, Houghton county.*

26. "By personal contact in the city of Lansing."—*J. W. Dann, Delta township, Eaton county.*

27. "From Leslie" (village).—*Geo. W. Swartwout, M. D., Aurelius township, Ingham county.*

28. "From two children from Mason who were visiting in the neighborhood."—*Henrietta A. Carr, M. D., Aurelius township, Ingham county.*

29. "Patient came here visiting from Ingham county."—*Tyler Hull, M. D., Windsor township, Eaton county.*

30. Brought from Belding."—*H. S. Sharp, Greenville city, Montcalm county.*

31. "From Keene township."—*Chas. Wunch, M. D., Saranac village, Ionia county.*

32. "Wise township."—*Geo. W. Thorpe, Denver township, Isabella county.*

33. "By infection at a picnic at Pleasant Lake, township of Henrietta, Jackson county."—*John Hunt, Rives township, Jackson county.*

34. "City of Jackson."—*John Hunt, Rives township, Jackson county.*

34. "A little girl came from Jackson * * * was sick, when she left Jackson."—*E. Emerson, M. D., Spring Arbor township, Jackson county.*

34. "From the township of Spring Arbor."—*Wallace J. Weeks, M. D., Hanover township, Jackson county.*

34. "Family exposed to the scarlet fever while visiting at Jackson."—*Joseph Jewett, Vevay township, Ingham county.*

35. "A little girl was taken visiting to Mr. G———'s in the township of Parma, and while there played with a doll which was handled considerbly by the G——— children when sick with scarlet fever some two or three months before that time. She came down with scarlet fever four days later."—*E. Emerson, M. D., Spring Arbor township, Jackson county.*

36. "As near as I can tell it came from Grand Rapids. There was a little girl who had recovered three or four weeks, here on a visit."—*J. W. Hawkey, M. D., Littlefield township, Emmet county.*

36. "From infected clothing brought from Grand Rapids."—*A. M. Martin, M. D., Odessa township, Ionia county.*

36. "From Grand Rapids."—*J. M. Rankin, M. D., Richland village, Kalamazoo county.*

36. "Visitor from Grand Rapids."—*Wm. Hyser, M. D., Plainfield township, Kent county.*

36 "Came from Plainfield, just out of the village."—*D. W. C. Burch, M. D., Rockford village, Kent county.*

36. "Brought from the city of Grand Rapids."—*Hugh J. Kelly, clerk, Tyrone township, Kent county.*

36. "Was brought from Grand Rapids."—*Jas. E. Maxwell, M. D., Decatur township, Van Buren county.*

37. "From Byron township."—*J. K. Hanna, M. D., Gaines township, Kent county.*

38. "The family were visiting in Kent county and came home. Six weeks after the oldest girl came down with it and exposed the others to it."—*F. H. Sowers, Elbridge township, Oceana county.*

39. "Brought by the family from Baldwin village" (Lake county).—*E. P. Aplin, Inland township, Benzie county.*

40. "Taken from Dryden school" (village).—*A. Price, M. D., Almont township, Lapeer county.*

40. The disease was in the village of Dryden first and spread from there to the township."—*John S. Caulkins, M. D., Dryden township, Lapeer county.*

40. "From children that attended school from Dryden township."—*F. E. Wolf, M. D., Melamora township, Lapeer county.*

40. "Dryden, Michigan."—*W. L. Cole, M. D., Oxford township, Oakland county.*

41. "By going to Adrian."—*E. Bates, Dover township, Lenawee county.*

41. "From Adrian."—*A. O. Wolring, M. D., Ogden township, Lenawee county.*

41. "Adrian."—*E. J. Ross, M. D., Rome township, Lenawee county.*

42. "A boy by the name of C———, of the township of Handy, Livingston county, visited at Mr. B———'s and exposed the family."—*Eugene D. Millis, M. D., Le Roy township, Ingham county.*

43. "Armada" [Macomb county.]—*Chas. E. Green, M. D., Riley township, St. Clair county.*

44. "The first one contracted the disease in Warren township."—*Ira G. Chapman, Sterling township, Macomb county.*

45. "Patient exposed in Marquette, Michigan."—*E. Neidhold, clerk, Wakefield township, Gogebic county.*

45. "By affected persons coming from Marquette."—*James H. Bogan, M. D., Holmes township, Mackinac county.*

45. "From Marquette."—*James H. Bogan, M. D., Mackinac Island, Mackinac county.*

46. "By contact in Ishpeming."—*John McGoffick, Ely township, Marquette county.*

47. "From Menominee, Mich."—*O. M. Sattre, M. D., Norway city, Dickinson county.*

47. "From Norway."—*H. R. Brown, Breitung township, Dickinson county.*

47. "In Menominee."—*Geo. W. Longhurt, Mellen township, Menominee county.*

48. "Contracted in the village of Crystal, Crystal township."—*Grant Terwilliger, clerk, Ferris township, Montcalm county.*

49. "D——H—— was taken sick while working on the Cooper Stock Farm in Bloomfield township. Some small children in the family where he boarded had an eruption with some fever previously, but disease was not diagnosed."—*J. W. Anderson, M. D., Troy township, Oakland county.*

50. "Grant township."—*Wm. Stringham, M. D., Shelby village, Oceana county.*

51. "From Rose township, Ogemaw county."—*Elsworth Orton, M. D., Waterford township, Oakland county.*

52. "Burdell township" [Osceola county.]—*F. T. Holcomb, Dover township, Lake county.*

53. "A little girl was brought here from Evart village [Osceola county,] who had just before had scarlet fever. She was peeling off at the time."—*Henrg Rowe, Baldwin village, Lake county.*

53. "From Evart village."—*Stuart Allen, Sylvan township, Osceola county.*

54. "Exposed at a funeral in the township of Hersey" [Osceola county.]—*James S. Canaan, Grant township, Mecosta county.*

55. "From the township of Middle Branch."—*Chas. Shore, Hartwick township, Osceola county.*

56. "From Reed City." [Osceola county.]—*N. R. Bradley, M. D., Green township, Mecosta county.*

56. "Reed City."—*Geo. Baker, M. D., Lincoln township, Osceola county.*

56. "From cases in Reed City."—*A. W. Miller, M. D., Richmond township, Osceola county.*

57. "From Potts." [Mentor township, Osceola county.]—*N. H. Traver, M. D., Albert township Montmorency county.*

58. "Brought here from the township of Bagley."—*Edward J. Scott, Dover township, Otsego county.*

58. "Gaylord."—*B. P. Pierce, M. D., Elmira, township, Otsego county.*

60. "A student in Albion college came here from Saginaw, taken sick a few days after arrival."—*I. C. Foster, M. D., Albion city, Calhoun county.*

60. "From children visiting from Saginaw."—*J. C. McCormick, M. D., Birch Run township, Saginaw county.*

61. "The disease was brought from Saginaw county."—*W. H. White, Venice township, Shiawassee county.*

61. "A child from Saginaw (an infected district) visited the family and communicated the disease to the children."—*Sylvester J. Smith, M. D., Fairgrove township, Tuscola county.*

62. "Contracted in the village of Laingsburg."—*C. M. Freeman, M. D., Sciota township, Shiawassee county.*

62. "Brought into the township from Sciota."—*G. W. Crouch, M. D., Woodhull township, Shiawassee county.*

63. "Going to school in Owosso."—*Wm. Parker, Caledonia township, Shiawassee county.*

64. "Vernon village." [Shiawassee county.]—*C. C. Blanchard, M. D., Linden village, Genesee county.*

65. "Some visitors came from Port Huron on Christmas eve and may have brought the disease."—*F. E. Bunting, M. D., Attica township, Lapeer county.*

65. "Contracted while on a visit at Port Huron."—*Wm. H. Gowan, M. D., Yale village, St. Clair county.*

66. "From the township of Nottaway."—*Frank Hull, Florence township, St. Joseph county.*

67. "I traced all these cases to exposure at Akron village on July 4th."—*Sylvester J. Smith, M. D., Fairgrove township, Tuscola county.*

67. "From Fairgrove township."—*Geo. P. Honeywell, Akron township, Tuscola county.*

68. "The child was visiting at Ann Arbor. Three children were sick in a house adjoining the one she was visiting at."—*J. L. Smith, M. D., Vernon village, Shiawassee county.*

68. "In the city of Ann Arbor."—*Thos. Young, Jr., Lyndon township, Washtenaw county.*

69. "Patient was attending college at Ypsilanti, came home sick."—*John N. Swartz, M. D., Hamburg township, Livingston county.*

70. "From a visit at Detroit."—*Wm. H. Erwin, M. D., Cohoctah township, Livingston county.*

70. "City of Detroit."—*Alex. Gunn, M. D., Lenox township, Macomb county.*

70. "Came from the township of Lenox."—*Joseph M. Winkel, Casco township, St. Clair county.*

70. "From the adjoining township of Lenox."—*M. T. Moore, M. D., Richmond village, Macomb county.*

70. "Detroit."—*Geo. F. Heath, M. D., Monroe city, Monroe county.*

71. "From Cadillac." [Wexford county.]—*N. I. Archbold, Rose Lake township, Osceola county.*

71. "Contracted from the city of Cadillac."—*Fred W. Hector, Clam Lake township, Wexford county.*

72. "From a scholar of the same school that was sick on returning from a visit in the south part of the State."—*Godfrey Crouse, New Haven township, Gratiot county.*

73. "From Chicago."—*Wm. M. Baldwin, Vandalia village, Cass county.*

73. "Came from Chicago."—*J. S. Newland, M. D., Walton township, Eaton county.*

73. "From Chicago."—*Otto C. McDannell, M. D., Lowell village, Kent county.*

74. "From Bristol, Indiana."—*Bela P. Schoville, M. D., Constantine village, St. Joseph county.*

75. "A lady with her two children went to Butler, Indiana. While there the children contracted scarlet fever. Their physician allowed them to return here within a week and while desquamation was taking place."—*J. R. Williams, M. D., White Pigeon village, St. Joseph county.*

76. "A child came from the State of Iowa to visit at the house of patient and while there came down with scarlet fever."—*B. M. Coykendall, Albion township, Calhoun county.*

77. "Ontario."—*H. C. Edwards, M. D., attending physician, Cass City village, Tuscola county.*

*Outbreaks Probably Traced to Former Cases.*

78. "Probably brought in clothing by a lady who attended some cases in Allegan about one year ago and came out visiting and while here ripped up a dress that she wore while attending cases in Allegan."—*A. D. Bangham, M. D., Homer village, Calhoun county.*

79. "Supposed to have been exposed in Alpena."—*David M. Thompson, Green township, Alpena county.*

80. "Supposed to have been introduced by visiting at Ionia in a house where scarlet fever had existed awhile before."—*C. D. Smith, M. D., Muir, village, Ionia county.*

81. "I think it came from the township of Ronald."—*Theo. R. McDonald, M. D., Orleans township, Ionia county.*

82. "Could not determine unless brought from Jackson in a suit of new clothes bought about fourteen days before the outbreak."—*Orrin Fowle, M. D., Moscow township, Hillsdale county.*

82. "Supposed to have been brought from Jackson."—*E. A. Chapman, M. D., Commerce township, Oakland county.*

83. "Supposed to have been contracted in Addison, Lenawee county."—*Edmund C. Davis, Amboy township, Hillsdale county.*

84. "Probably carried in clothing from the township of Madison."—*M. A. Jerome, M. D., Fairfield township, Lenawee county.*

85. "Supposed it was from exposure to cases that occurred about the same time in the township of Deerfield."—*Joseph McNeese, M. D., Morley village, Mecosta county.*

86. "Supposed to be from Lakeview village, Montcalm county."—*Chas. Wunch, M. D., Boston township, Ionia county.*

87. "It is thought to have come from Riley township."—*D. H. Cole, M. D., Memphis village, Macomb county.*

88. "It is supposed to have been carried to Lakeville where it first broke out from Caro, Mich."—*W. J. Hare, M. D., Addison township, Oakland county.*

88. "Case No. 1 is believed to have caught it in Caro of a person after recovery."—*Joseph F. Malburg, Gilford township, Tuscola county.*

89. "Except it would be from an aunt that came visiting about two weeks ago from Ypsilanti where she was attending school, and some of her classmates were infected with the disease."—*W. J. Hare, M. D., Addison township, Oakland county.*

90. "Supposed to be contracted by a child while visiting in Detroit."—*T. L. Iddings, M. D., Manchester village, Washtenaw county.*

91. "Think they got it at Cadillac."—*Peter Will, Colfax township, Wexford county.*

92. "Probably in clothing of parents shortly after their return from the World's Fair."—*C. B. Marks, M. D., Copemish village, Manistee county.*

93. "The first case was brought here from the west (Iowa), I think."—*C. A. Bell, M. D., Whiteford township, Monroe county.*

## NEGLECT OF MEASURES TO RESTRICT SCARLET FEVER, VIOLATION OF PUBLIC HEALTH LAWS, ETC.

### *Outbreak of Scarlet Fever in Atlas Township, Genesee County.*

In regard to failure to use precautionary measures in an outbreak of scarlet fever in Atlas township, Genesee county, in which there were reported to have occurred 30 cases, the health officer, Amos S. Wheelock, M. D., wrote:—

"Many families do not employ a physician, and we know nothing of it till all are well. Physicians fail to report to me in many cases."

### *Outbreak of Scarlet Fever in Baldwin Village, Lake County.*

The following report from Henry Rowe, health officer of Baldwin village, Lake county, in reference to an outbreak of scarlet fever in his jurisdiction in which there were reported to have occurred 16 cases and one death, shows the fatal result of imperfect disinfection:—

"A girl was brought here from Evart that was not fully recovered from scarlet fever. Her skin was peeling off her at the time she came here. A few days later two children were taken with scarlet fever in the house she was at. As soon as it was reported to me I placarded the house. When the doctor told me it was safe to take the card off the house I did so. As soon as I took the card off the house the man of the house went almost the entire length of the village. He met the two little Bell boys, talked with them, kissed one of them. The one he kissed died. I think he carried the disease in his beard.'"

### *Outbreak of Scarlet Fever in Menominee City, Menominee County.*

Concerning neglect of measures of restriction in an outbreak of scarlet fever in Menominee city, in which 73 cases and 7 deaths were reported, the health officer, H. L. Rosenberry, M. D., wrote to the Secretary of this Board as follows:—

"The trouble lies in the improper facilities for isolation. They are in tenement houses, and without a hospital they can't be kept apart. What would you advise with this fearful death rate?"

In reply to the above Secretary Baker wrote, July 17, 1893, as follows:—

"Referring to deaths from diphtheria and scarlet fever you ask, 'What would you advise with this fearful death rate?' I advise that all health officers comply strictly with the recommendations of this Board, as set forth in its publications on the prevention and restriction of diphtheria and scarlet fever, and that you secure the coöperation of the people by distributing our pamphlets *to the neighbors of the sick.*

"I appreciate the difficulties under which you labor, in your efforts to secure thorough isolation of the sick and infected, when the sick persons reside in 'tenement houses.' A public contagious-disease hospital would be of great benefit to your city, and I trust that the time will soon come, when all of the principal cities of this State will be supplied with such hospitals."

On June 5, 1893, Dr. Rosenberry wrote the following question to this Office:—

"Do you think a cresolene lamp will do away with the necessity of disinfection when the outbreak is over."

June 14, 1893, Dr. Baker replied as follows:—

"Accept thanks for your letter of June 5, relative to scarlet fever, which was received at this office during my absence. You ask, 'Do you think a cresolene lamp will do away with the necessity of disinfection when the outbreak is over?'—No, most emphatically not."

### *Outbreak of Scarlet Fever in Port Huron Township, St. Clair County.*

Relative to an outbreak of scarlet fever in Port Huron township, St. Clair county, the supervisor, C. A. Bailey, wrote to this Office, Dec. 14, 1893:—

"There is a case of scarlet fever in our township * * * . This family has had two cases. One Dr. ——, of Port Huron city, was the physician. He has not notified our health officer or Board of Health of either case. They had the fever for two weeks before we knew of the cases, no card on the house during this time. It seems to me the doctor should be dealt with according to law. What is your opinion? Please let us know."

Dec. 16, 1893, the following reply was sent by the Secretary to C. A. Bailey's letter:—

"Accept thanks for your letter of Dec. 14, relative to scarlet fever in your township. I have written to the health officer, B. J. Ward, relative to the subject.

"Section 1676, Howell's statutes requires the attending physician to report any case of a dangerous communicable disease to the health officer, the president or the clerk of the jurisdiction in which the case is. If he fails to do so, he is liable to a fine as provided in the same section.

"Section 8439, Howell's Statutes *requires the supervisor*—'Whenever he shall know or have good reason to believe that any penalty or forfeiture has been incurred within his township, which shall be recoverable by action before a justice of the peace,' * * * '*forthwith to commence and prosecute a suit*,' * * * . This law should be obeyed.

"I enclose herewith a pamphlet with portions marked bearing on the subject. Also a blank form of notice for the use of householders and physician, recommended by this Board. I think the physicians should be supplied with a liberal quantity of them at the expense of the township."

### *Outbreak of Scarlet Fever in Manchester Village, Washtenaw County.*

In an outbreak of scarlet fever in Manchester village, Washtenaw county, the health officer, T. L. Iddings, M. D., reports 17 cases, 10 of which he traces to a former case. Feb. 4, 1893, Dr. Iddings wrote to the Secretary of this Board relative to this outbreak, as follows:—

"We have scarlet fever of a mild form in four families within my jurisdiction. Is it customary to quarantine the members of families in which scarlet fever exists, and in your opinion is it necessary? Our village ordinance fixes the health officer's compensation at $10 per year. For this sum is a physician expected to neglect his own private practice and give considerable of his time to looking up reported cases, placarding houses, disinfecting clothing, * * * etc?"

Feb 7, 1893, the following reply was sent to Dr. Idding's letter:—

"You ask—'Is it customary to quarantine the members of the family in which scarlet fever exists, and in your opinion is it necessary?'—Yes; to both questions, provided they are sick or *infected* with the disease. The law requires that any one who is infected with a disease dangerous to the public health shall be isolated (quarantined).

"I note what you say relative to the meager salary received by you for performing the duties of a health officer. The compensation of a health officer should be greater than he can obtain for the same time by the regular practice of his profession as a physician. This is seldom the case, however. In a great majority of cases the health officer performs a great part of his work for nothing. I trust that you will place the subject carefully before your board of health and that you will receive the proper compensation for the performance of the duties required of you by law. I enclose pamphlets bearing upon the subject."

### *Outbreak of Scarlet Fever in Chippewa Township, Mecosta County.*

In an outbreak of scarlet fever in Chippewa township, Mecosta county, there were reported to have occurred 23 cases and 1 death, 14 of which were traced to a former case. The following extracts from the report of the health officer, Dr. Albert A. Patterson, show the difficulty of thorough disinfection in many cases:—

> "On account of families having to reside on premises it was very inconvenient to disinfect whole of houses."
>
> "The house could not be disinfected as it was a log shanty, only one room, and there is still a case of typhoid in the family."
>
> "Occupation of the house, and great inconvenience if the whole house had been disinfected, and as it was a mild form (scarlatina) I consider it unnecessary."

## FATAL RESULTS OF FAILURE TO APPOINT HEALTH OFFICER.

### *Outbreak of Scarlet Fever in Pinora Township, Lake County.*

At the beginning of an outbreak of scarlet fever in Pinora township, Lake county, the supervisor, Samuel Wolfe, reported that there was no health officer. As a result of this negligence, isolation and disinfection were neglected, and 21 cases and four deaths occurred during the outbreak. The following letter on this subject was received at this office from Mr. and Mrs. Walter Armstrong, residents of Pinora township:—

> "SIRS:—On June 17, 1893, our little boy died of scarlet fever. The doctor told us that the Board of Health would make arrangements for the burial, and he notified Chester Wells, health officer of our township, immediately. But no one ever came near us, we were left to bury our child alone as best we could. We were never quarantined nor notified to stay at home, or take any precautions to prevent the disease spreading. We have done the best we knew how, but think the Board of Health ought to be looked after, and not allowed to be so careless. Other children having recovered from scarlet fever are allowed to leave home while peeling. That is the way our child was exposed. We hope you will look into the matter as the disease is still raging in this country."

### *Outbreak of Scarlet Fever in Akron Village and Fair Grove Township, Tuscola County.*

In regard to an outbreak of scarlet fever in Fair Grove township, Tuscola county, the source of contagium of which the health officer, S. J. Smith, M. D., traces to Akron village, Dr. Smith writes as follows:—

> "We are badly mixed up here. The case * * * took the disease from a near neighbor. Three children had the disease (rather mildly), which was not reported by any one to any one. They ran everywhere and mingled with hundreds on the Fourth. * * * There are several cases in the village of Akron, uncared for by any one 'till today. The board of Akron will appoint a health officer today."

This case occurred in July; and in a final report for October, 1893, Dr. Smith wrote:—

> "The disease was communicated by a scarlet fever patient in the village of Akron. The patient —— visited the girl sick with scarlet fever in Akron village."

To this outbreak in Fair Grove township, Geo. P. Honeywell, the health officer of Akron township, traces an outbreak of 36 cases in his jurisdiction, where there was no health officer appointed until the outbreak began.

### *Results of Neglect to Isolate Mild Forms of Scarlet Fever.*

The following extracts from health officers' reports show that a large number of cases in the following outbreaks was caused by neglect to isolate mild cases of scarlet fever:—

"I found that there had been over 20 cases, mostly of a mild form. * * * The fever broke out about eight weeks since, and why the doctor failed to report is more than I can tell. One trouble why the disease has spread so is on account of the mild form. I find he (the doctor), has neglected to post any notices."—*George Culver, Danby township, Ionia county.*

"Two children in the same house had scarlet fever some six or eight days previous. These children that I report came with their parents visiting. In five days they were taken with scarlet fever. These three cases as I learned were all attended by a physician, but I had received no notice of it, and no precautions had been taken to prevent the spread of the disease. They were all light cases, and I understand that the doctor sometimes called it scarlet fever and sometimes refused to name it at all."—*Wallace J. Weeks, M. D., Hanover township, Jackson county.*

"This case is the first reported to me, and was not reported till the child had been sick eleven days. The contagium was caught from another family of five children who had it in a mild form and were allowed to run at will all over the neighborhood."—*Daniel Borland, Deerfield township, Mecosta county.*

"Some did not know they had it until others came down with it; then they disinfected."—*Harvey Holcomb, Eaton township, Eaton county.*

There were 16 cases reported in this outbreak.

In an outbreak of scarlet fever in Plainfield township, Kent county, the health officer, Dr. W. Hyser, reports the source of contagium to have been from a visit of a child from Grand Rapids, who had the disease in so mild a form, "the child scarcely out of health," it was not reported. In answer to the question, "What exceptions were there to the complete accomplishment of the foregoing measures of isolation and disinfection, after the first person was taken sick?"—Dr. Hyser stated, "Two taken sick and not reported. Cases so mild that they were not supposed to have it."

To this neglect of mild cases in Plainfield township, Dr. W. C. Burch, M. D., the health officer of Rockford village, Kent county traces an outbreak of 33 cases in his jurisdiction.

"The number of cases in the outbreak was 23, most all children. The doctors did not call it scarlet fever; only one case and the rest scarlet rash, so that is the reason they did not attend to disinfection as they should."—*Albert Overhiser, Casco township, Allegan county.*

### *Outbreak of Scarlet Fever in Reed City.*

An outbreak of scarlet fever was reprted to this Office May 5, 1893, from Reed City village, Osceola county, by the health officer, Horatio L. Foster, M. D. On receipt of Dr. Foster's report, a blue letter was sent from this Office. Nothing more was reported to this Office by Dr. Foster, relative to this outbreak; but the following letter of complaint from G. T. Field, Chase township, Lake county, dated May 31, 1893, was received:—

"There is a severe scourge of scarlet fever in Reed City, seven miles from here, so reported. They are sending children from this infected place into the village of Chase and also into the township of Chase. The village of Chase has abandoned its corporation. There has been no election for nearly two years. No village board exists from removals, etc. The township has done all matters in the village same as any other part of the township. The village corporation has never been set aside by any act of the legislature. The township health officer undertook to quarantine a house in the village where children were kept recently brought from infected Reed City. It was decided he, the township health officer, had no jurisdiction. What can be done in the matter? Is Chase obliged to become a dumping ground for Reed City's filth and disease? Is there no remedy? Please let us hear from you at once."

June 2, 1893, Secretary Baker wrote to the health officer and the president of the village of Reed City stating that he had heard nothing in regard to the outbreak of scarlet fever since May 3, 1893, and asked just what was being done to restrict the disease and what grounds Chase township had for complaint.

In reply to Secretary Baker's letter, the president of the village wrote that they were doing all they could to restrict the spread of the disease.

The health officer, Horatio L. Foster, M. D., wrote:—

"I have ordered the schools closed, the families have been strictly quarantined and every precaution used to restrict the disease. There are absolutely no grounds for the people of Chase to make any such complaint. We do not allow any children under ten on the streets here."

It is, however, quite evident that the outbreak was neglected, for in the final report sent to this Office Dr. Foster reports 16 cases, only 5 of which were isolated from all except the nurse and physician, and but 25 pounds of sulphur used in 15 households.

Further complaint of the neglect of this outbreak was received from the health officer of Richmond township, A. W. Miller, M. D., who wrote, June 24, 1893, as follows:—

"In the beginning of this epidemic the health board of Reed City took no action to prevent its spread until quite a number were exposed or sick, and then not until some began to die. Then fright of the inhabitants drove the board to action. The town was and is bitter against the board for their inactivity in trying to check its spread. After strict quarantine was commenced only one new case has occurred, except in those families that had already some member of the family sick. All families that had the disease and nurses were not allowed out of their yards and a man was hired to visit their homes every three hours to attend to their wants. The town is now loud in the praise |of strict quarantine. The disease is now apparently stamped out."

The following letter was sent to this Office, June 2, by Henry L. Watson, the clerk of the village of Reed City:—

"Has the township board of health jurisdiction within the village limits as to quarantine, etc.? s it proper for village to audit and pay all bills for services, necessaries, etc., furnished to residents of said village and can they compel the county to pay them the same as if ordered by the township board? Who pays the persons who act as guards and look after the wants of quarantined families? Is the village clerk a member of the board of health or simply clerk of the board?

"Our case is this: We have a number of cases of scarlet fever and one faction says it is the duty of the township board and the other holds they have no jurisdiction in the case which must be attended to by the village board. Please send me a copy of the health laws and such other information as may suggest itself."

In reply to the above questions Secretary Baker wrote, June 3, 1893, as follows:—

"The township board of health has *no* jurisdiction in a village, if the village be an incorporated village.

"Expenses incurred in the restriction and prevention of dangerous communicable diseases in a village should be audited by the local board of health, and it is the duty of the board of supervisors to allow at once and provide for its payment

"Unless the clerk of the village is a member of the council, or trustees, he is not a member of the local board of health. By this mail I send you a copy of the Public Health Laws in force in 1890, in which I have marked that part bearing upon the organization of the village board of health, and other questions asked in your letter. I also send you a copy of the 'Work of Health Officers,' in which I have marked the duty of local boards of health and of the health officer as its executive officer."

## DIFFERENCE OF DIAGNOSIS.

### *Outbreak of Scarlet Fever in Cass City, Tuscola County.*

A case of scarlet fever was reported to the health officer of Cass City village, Tuscola county, by the attending physician, Dr. H. C. Edwards. After seeing the patient, the health officer, Dr. J. M. Truscott, refused to take restrictive measures because he did not consider it a case of scarlet fever. Dr. Truscott and Dr. Edwards wrote to the State Board of Health for instructions.

The following extract is from Dr. Truscott's letter of Jan. 25, 1893:—

"I see that the *law* requires me, on receiving notice from an attending doctor or otherwise, of a case of contagious disease, to go and investigate is my *first duty*. Please tell me at once what I am to understand by the term *investigate?*"

As soon as the above was received the following reply was sent by the Secretary of this Board:—

"In response to your question relative to the meaning of the word 'investigate' in the law,—I think it means that when a rumor of the presence of a dangerous communicable disease in your jurisdiction reaches you in a round-about way that you are to go and look the case over; but when a physician in ordinary practice reports a case, this Board believes that it is the duty of the health officer to accept the statement of that physician that the case is scarlet fever, diphtheria, or other dangerous disease, and to take prompt and vigorous measures as required by law. Under such circumstances it is *not* necessary for the health officer to see the patient before taking restrictive measures. If, however, the attending physician decides that it is *not* a case of dangerous disease, the health officer should *not* relax the restrictive measures unless *he himself is convinced* of the safety of so doing."

The health officer, Dr. Truscott, again wrote to Secretary Baker asking if he was not doing right in insisting upon going with the attending physician to investigate the reported case of scarlet fever.

The following reply was sent Feb. 4, 1893:—

"I know of no law which makes it the '*first* duty of the health officer' * * * 'to go and see the patient with the attending physician before putting up a placard and reporting to Lansing,' but section 1, of Act 137, Laws of 1883, *does* require the health officer when he 'shall receive reliable notice or shall otherwise have good reason to believe that there is within' his jurisdiction a 'disease dangerous to the public health' * * * 'immediately to investigate the subject,' and do certain other duties. There is nothing in the law of which I am cognizant, that, seems to me, can be construed to mean that the attending physician shall accompany the health officer during such investigation, and I do not think it would be for best interests of all concerned for the attending physician to do so, in every instance. The attending physician could not conscientiously request the patient to pay him for the visit with the health officer, and he could not collect anything from the local board of health (unless he made such visit by its request), and he could not be expected to perform the extra service for nothing, which, in some instances would require miles of travel, if the case was located in the country. In order to simplify what this Board believes to be the duty of the health officer in just such instances as is above referred to, this Board passed a resolution at its regular meeting, July 10, 1888, a copy of which was sent to you Jan. 28, 1893, which is as follows:—

"'*Resolved,* That it is the opinion of this State Board that when a case of a dangerous communicable disease is reported by a reliable physician, the health officer should act upon the diagnosis of such physician without question.'

"I believe it to be the 'first duty' of the health officer to 'immediately investigate the subject' when he knows or has good reason to believe that 'a dangerous communicable disease is present, and to promptly notify this office of the occurrence of such a disease."

In a letter to Secretary Baker, dated Feb. 18, 1893, Dr. Truscott wrote:—

"Several times in my practice of fourteen years have I wished with all my heart that the State had a reserved fund by which such men [expert inspectors of contagious diseases] could have their expenses paid to go to places where necessary work is needed. * * * . A brother doctor comes and says that he has a case of scarlet fever, put up placard, health officer goes and puts up placard. In two days, doctor comes and says it was a mild case, take down placard, and so health officer goes and takes down placard, * * * ."

On February 20 Secretary Baker replied to Dr. Truscott as follows:—

"I note what you say relative to placarding houses where scarlet fever is present *in mild form. Mild* cases of the disease may cause malignant cases, and therefore in all cases of scarlet fever in mild form, the same precautions should be taken to prevent its spread as in *any* case of scarlet fever.

"The health officer should *not* remove the placard merely because the attending physician pronounces the case as one of a mild form; nor because the physician says it is recovered, except the health officer is satisfied that the period of desquamation is passed, and he has himself disinfected the premises.

"The health officer is not required to comply with the suggestions of the attending physician as to placarding the premises, and the isolation of the sick or infected. The law requires that the health officer shall attend to those subjects, whenever a case occurs, and comes to his knowledge."

## *Outbreaks of Scarlet Fever in Dryden Village and Dryden Township, Lapeer County.*

In an outbreak of scarlet fever in Dryden village, Lapeer county, in which there were 25 cases reported to have occurred, the health officer, Dr. I. E. Parker, reports that owing to the mild form of the disease and the difference of diagnosis, it was impossible in many cases to isolate or disinfect. To this neglect of mild cases is traced an outbreak in Dryden township in which there were reported to have occurred 100 cases. There were no fatal cases, but the health officer, Dr. John S. Caulkins, wrote:—

"The worst trouble has been with sequels, the worst of which has been Brights' disease, about one to twenty.

As Dr. Caulkins reports about 70 cases traced to a previous case, and states that the evidence of success attending the efforts at restriction was:—"That in no case can the spread of the disease be traced from a house fully isolated and disinfected," the necessity for restriction of mild cases is clearly shown.

The following letter, dated January 23, 1893, was received from the board of health of Almont township, Lapeer county:—

"It is reported to us by our township health officer, and also from other sources, that there are several cases of scarlet fever in the township of Dryden not quarantined; that there are quite a number of cases which have been pronounced scarlet fever by the township health officer, the others are pronounced scarlet rash by the physician in attendance; but our health officer believes them to be scarlet fever, and that they are not so pronounced in order to avoid quarantining. We have one case on the west line of our township believed to have originated from the same source, and which is being quarantined, and we would ask protection against Dryden."

In reply, January 25, the Secretary wrote:—

"Accept thanks for your joint letter of January 23, relative to scarlet fever in Almont and Dryden townships. I have written to the health officer of Dryden township, relative to this subject, and this office will do all it can to assist in the prevention of the further spread of scarlet fever in or from Dryden township. Dr. Caulkins, the health officer of that township, has reported the disease to this office, and spoken of the trouble which you mention, the differences in diagnosis. I hope to learn soon that proper precautions are being taken in every instance to prevent the spread of the disease."

### *Outbreak of Scarlet Fever in Orleans Township, Ionia County.*

Relative to an outbreak of scarlet fever in Orleans township, in which there were reported 19 cases, 12 of which were traced to a former case, the health officer, Dr. T. R. McDonald, wrote, May 24, 1893, as follows:—

"There was complaint made to me a day or two ago that there was scarlet fever in and about Shilo, north-east part of this town, and yesterday I investigated and found that there had been scarlet fever there ever since January, and at present time there are no less than nine cases there, none of which have been reported to the Board of Health, and all, or most of them, have been attended by Dr. ———, of ———. Patients are allowed to go in and out without restriction to school, etc. Some are alarmed and some are not. They will not believe me when I say it is scarlet fever, because Dr. ——— has not called it that. Mr. ——— threatened me when I placarded his house, and said he would pull it down, also let his children go to school and come in contact and expose other children. They are all scaling badly. I write to you for information. What shall I do, and have I a right to call upon any other physician to confirm my diagnosis? If so, whom? and at the expense of whom?"

May 25, 1893, the following reply was sent from this Office to Dr. McDonald:—

"Accept thanks for your letter of May 24, and for the telephone message, relative to scarlet fever. 'Scarlet Rash' is but another name for scarlet fever, and the same precautions to prevent its spread should be taken, as are taken in cases of scarlet fever.

"The laws of this State give to health officers, and local boards of health almost absolute power over anything relating to the restriction and prevention of diseases. If your orders relative to isolation, made in accordance with law, have been disobeyed, and placards removed without your permission, you as a township officer, should report the facts to the supervisor, who is required 'forthwith to commence and prosecute a suit, in the name of the people of this State' for the penalty incurred. See sections 8139 and 8140, Howell's statutes. Action can also be brought against any one who wilfully exposes another to the danger of contracting scarlet fever, under Act 15, Laws of 1891. The prosecuting attorney, of the county, shall, if requested, 'Attend to and conduct such suit on behalf of the plaintiff.' See section 8142 Howell's statutes.

"I send you by mail, two pamphlets, with portions marked bearing upon the subject under consideration. I would suggest that you comply with the law—report the transgressions of the law to the supervisor, and that *he* comply with the law—section 8139 Howell's statutes.

"You certainly have 'a *right* to call upon another physician to confirm' your diagnosis, if you so desire, but *it is not necessary* in order to comply with the law, for section 1, of Act 137, Laws of 1883, requires you to act (unless you 'shall have been instructed by' your board of health, 'to do otherwise') when you '*have good reason to believe*' that a dangerous and communicable disease is present within your jurisdiction.

"I can recommend John W. Hauxhurst, M. D., of West Bay City, Mich., as a competent physician, but you may know of some other, nearer to you, whom you would prefer, if you conclude to call another physician into consultation. The expense of such expert testimony should be paid for by the township. Probably it would not be so paid unless first authorized. There is no fund at the disposal of the State Board of Health that can be used for such special investigations."

### OUTBREAKS OF SCARLET FEVER IN WHICH ISOLATION AND DISINFECTION WERE ENFORCED,—RESULTS.

The following is the substance of a few health officers' statements which are representative of the statements of those health officers whose reports indicated that they had quite carefully enforced isolation and disinfection:—

Concerning an outbreak of scarlet fever in Genoa township, Livingston county, the health officer, Charles E. Beurmann, wrote:—

"Several children in the neighborhood had sore throat, but nothing was said about it and no doctor employed, till this little girl was taken sick when it proved to be scarlet fever."

The instructions of the State Board of Health regarding isolation and disinfection were strictly carried out in this case. The health officer reports that the evidence of success attending the efforts at restriction were that it spread no further from this case, although it was in a public place, a country store and postoffice.

In regard to success attending measures of restriction taken in an outbreak of scarlet fever in Manistee city, Manistee county, the health officer, Jas. A. King, M. D., wrote, June 9, 1893, as follows:—

"We had a single case in the 'Home,' a charitable institution containing thirty odd girls from ten to eighteen years old, but by reason of efficient quarantine and intelligence we were able to prevent its spread beyond the first case. Though she was quarantined in a room of the building."

In an outbreak of scarlet fever in Chippewa township, Mecosta county, in which fourteen out of twenty-three cases were reported traced to a former case, the health officer, Dr. Albert A. Patterson, wrote, in a final report, that in a family having three cases of scarlet fever one child being kept isolated escaped the contagium.

Concerning an outbreak of scarlet fever in Algoma township, Kent county, the health officer, D. W. C. Burch, M. D., reported regarding measures of restriction, in substance as follows:—

There were four cases in two households. Patients were kept in a room cleared and prepared for that purpose, and kept there for thirty days with no company except nurse. All clothing, bedding, etc., exposed to the infection were disinfected in zinc solution and fumes of burning sulphur. The contents of the privy vault were disinfected with sulphate of iron and wood ashes. When the cases had recovered all the rooms in the house were disinfected by fumes of burning sulphur, at the rate of three pounds of sulphur per 1,000 cubic feet of space.

Regarding an outbreak of scarlet fever in the city of Monroe, Monroe county, the health officer, Denias Dawe, M. D., reported substantially as follows:—

Kept the patients in an upper room with the nurse, and prevented people visiting at the house. Disinfected discharges of patient with chloride of lime and buried them. Disinfected the contents of privy vault with three pounds of chloride of lime and copperas. When the cases had recovered, all the rooms in the house, the privy, all infected clothing, bedding, etc., were disinfected by fumes of burning sulphur at the rate of three pounds per 1,000 cubic feet of space.

In regard to an outbreak of scarlet fever in Durand village, Shiawassee county, which was limited to the first case, the health officer, Dr. F. S. Love, reported substantially as follows:—

The patient was isolated from all except nurse and physician. The discharges of the patient and the contents of the privy vault were disinfected by bromo-chlorine. All infected clothing, bedding, etc., were disinfected by fumes of burning sulphur and washing. After the case recovered all the rooms of the house were disinfected by fumes of burning sulphur at the rate of four pounds per 1,000 cubic feet of space.

Concerning an outbreak of scarlet fever in New Buffalo village, Berrien county, which was confined to the first case, the health officer, F. M. Gowdy, M. D., reported substantially as follows:—

The patient was isolated from all but nurse and physician. The discharges of the patient were disinfected by chloride of lime and buried. The privy vault was disinfected by fumes of burning sulphur and the contents of vault by copperas. During the sickness, and after recovery, all infected clothing, bedding, etc., were disinfected by fumes of burning sulphur, and after recovery all the rooms of the house were disinfected by fumes of burning sulphur at the rate of three pounds per 1,000 cubic feet of space.

## *Outbreak of Scarlet Fever at the Michigan School for the Deaf, Flint City, Genesee County.*

An outbreak of scarlet fever in the Michigan School for the Deaf, at Flint city, Genesee county was reported to this Office by F. D. Clarke, Superintendent of the School, to have commenced, December 22, 1893, and to have ended, April 24, 1894.

The following quotations are taken from a report of this outbreak, written by Supt. Clarke, which was published in The Deaf Mute Mirror of Feb. 23, 1894:—

"On the twenty-third of December, two boys, who had been ailing for a day or two, and who fortunately were the only ones in the hospital, developed scarlet fever in a mild form. The greatest precautions were at once taken to prevent its spread, and for awhile we thought we were successful; but on December 30th another case occurred, and the following notice was at once sent to the friends of all those children who were at home:—

"FLINT, Mich., December 30, 1893.

"DEAR SIR,—

"Since your child went home for Christmas, a mild form of Scarlet Fever has broken out here. We have three cases now. They are carefully isolated and every precaution will be taken to prevent the spread of the disease. The doctor does not think that there will be any danger in your child's returning; but the object of this letter is to allow you the chance to keep him at home until all possibility of infection is removed.

"We will try and arrange to have the railroad tickets extended, or if we cannot do that, to have part of the money refunded. Please send the tickets to us at once, if you decide to keep your child at home.

"Yours respectfully,

"F. D. CLARKE,

"*Superintendent.*"

"The effect of this circular was that ninety of those who had gone home for Christmas remained there. Some parents even keeping children who had already had the fever at home, though medical men hold that one attack is a perfect protection against another.

"In the meantime the Board of Health of the city of Flint, had made regulations to prevent the spread of the disease, the most important of which, as regards persons outside the school, were that no visitor should be received here, no clothing should be sent out, and nothing, not even a letter, should go out of the hospital.

"On the eighth of January new cases again occurred, and though we thought we were doing everything that we could do, an appeal was made to the State Board of Health to send an expert here to examine our buildings, hospital, etc., and see if we were leaving anything undone."

The first intimation that the State Board of Health had of the existence of this outbreak at the School was the following letter, from Supt. F. D. Clarke, which was received, Jan. 12, 1894:—

"I am directed by our Board to write you in regard to the present outbreak of scarlet fever in our school.

"Though we have the greatest confidence in our own doctor, and in our City Board of Health, we feel that others, especially the parents of our children, might feel more at ease if we could tell them we were doing everything that the *State* Board thought necessary; * * * .

"Thus far we have had twelve cases, the four most recent ones beginning on the 8th. All have been very light.

"We desire, if possible, that you send us an expert in preventing the spread of this disease, who can meet with our doctors and see if we have done everything that should have been done, and if not, tell what should be. Personally I would be obliged for a dozen or more copies of any printed information you may have on this subject."

Jan. 12, 1894, the Secretary of this Board wrote in reply to the above letter, as follows:—

"Accept thanks for your letter of Jan. 11, relative to the presence of scarlet fever in your school. By this mail I send you 25 copies of the pamphlet on the restriction and prevention of that disease. I think it would be beneficial, if you would place a copy of that pamphlet in the hands of each of your employés. If you can use more of them, I will be pleased to send them to you. If the suggestions contained in that pamphlet are accepted and observed, I think you will succeed speedily in restricting the spread of the disease. Every case or suspected case or person known to have been exposed, should be isolated, and the thorough disinfection of all infected rooms and things should be accomplished.

"We have not received the return of the name and address of the health officer of the city of Flint, for the current year, therefore, I have written to the mayor of the city relative to the subject.

"Any assistance which this Office can render you in your efforts to restrict the disease, will be cheerfully rendered. Have the kindness to keep this Office informed of the progress of the disease, and of your success in restricting it. Blanks are sent you today for reports.

"This Board is to meet today, and if a quorum is present, your request will be put before it. Perhaps an expert can be sent as you request."

And on the same day, Jan. 12, the Secretary sent the following letter to the mayor of the city of Flint:—

"I am informed that scarlet fever is present in the Michigan School for the Deaf. This Board has been asked to send an expert there to do that which is required by law of your health officer and local board of health. I infer that *you have* no health officer, and have not complied with section 1634 Howell's statutes, which requires every board of health to appoint one.

"This Board is handicapped in its efforts to assist your board in restricting the spread of dangerous communicable diseases for the reason that it does not know the name of your health officer (if you have one). A request for the return of the name of your health officer was sent to you and also to your city clerk, April 3, 1893, and again to the clerk, June 5, 1893. No reply has been received to either of the requests.

"I enclose herewith, a blank for the return of the name of your health officer, also a copy of the law bearing on the subject.

"I trust it will not be necessary to place the matter in the hands of the prosecuting attorney of Genesee county, in order to secure the proper observance of the law in your city."

In response to the request of Supt. F. D. Clarke, for an expert to aid in the restriction of scarlet fever in the State School for the Deaf, the State Board of Health sent Dr. John W. Hauxhurst, of West Bay city.

The following letter, dated Jan. 15, was received at this Office from Supt. F. D. Clarke:—

"Yours of the 12th received on Saturday morning, and on the same afternoon Dr. Hauxhurst put in an appearance.

"He was unable to suggest anything more than has been done, but as a relief to our anxiety and worry his visit was a great success.

"I suppose he will make a report to your board, and if not against your rules, I would be obliged to you for a copy for my own board, as I think he will recommend an outside hospital here. I enclose the report you ask for. Thanking you for your promptness."

Jan. 17, Dr. Baker wrote to F. D. Clarke, as follows:—

"Accept thanks for your weekly report on blank 'M' for the week ending Jan. 13, and for your letter of Jan. 15, relative to scarlet fever in your institution.

"Relative to the source of contagium you say,—scarlet fever supposed to be from contact before disease developed in former cases. Will you have the kindness to inform me where the 'former' cases are or were? If outside of the school, I would be pleased to learn the name of the township, village or city, so as to be able to write to the proper health officer.

"Dr. Hauxhurst's report has not been received yet. When it arrives, I see no good reason why you should not be supplied with a copy of it, and I shall be pleased to send it to you. I am glad to know by your letter that he found everything being done that should be done."

Later, Dr. Hauxhurst's report was received. It is as follows:—

## *Report of Investigation of Outbreak of Scarlet Fever at the State School for the Deaf at Flint, by John W. Hauxhurst, M. D., of West Bay City.*

"*West Bay City, Michigan, January 15th, 1894.*

"*Dr. Henry B. Baker, Secretary State Board of Health, Lansing, Mich.:*

"DEAR DOCTOR:—Your message, inquiring if I could investigate outbreak of scarlet fever in School for Deaf, at Flint, was received on Saturday last, just in time for me to get to the last train for that day, which would enable me to return before Sunday, and at the same time allow me nearly seven hours to inspect the buildings and cases of sickness.

"This being so, and deeming it important to give the matter prompt attention, I immediately repaired to the F. & P. M. 11:35 A. M. train, telegraphing you on my arrival at Flint, as you already know.

"Acting in accordance with your answer to my message, a thorough inspection of the buildings, their system of drainage and closets, together with the cases of sickness, the rooms in which they are quarantined and cared for, and the grounds as well, was made by Dr. Murry, Superintendent Clarke and myself.

"The whole number of cases, up to date of my visit, were twelve, being attacked in the order named:

| | |
|---|---|
| Dec. 23 | 2 boys. |
| " 30 | 1 boy. |
| " 31 | 2 boys. |
| Jan. 2 | 1 boy. |
| " 8 | 1 " |
| " 9 | 3 girls—1 boy. |
| " 11 | 1 boy. |

The sanitary condition of the buildings, with the one exception hereinafter named, is most excellent, and their resources for ventilation and drainage are of the best.

"The floors are attractively clean, while the air in all the rooms seemed as sweet as the open doors, not excepting that in the closet rooms, whose basins were clean, with perfectly operating flushes. No smell of noxious gas was detected in the whole group of buildings.

"I made inquiry as to the presence of a case of scarlet fever in the institution previous to the present outbreak, and neither Superintendent Clarke nor Dr. Murry had knowledge or record of such, and I could not learn of a possible infection from such source.

"There appears, therefore, only one reasonable conclusion as to the source of the contagium in the institution, and this is that it was introduced from without.

"How and from where is uncertain, but probably by visitors to the rooms.

"It may have been by letter or mail package from some home in the State having the disease, but none of the children having the disease had received packages of clothing or other articles by express since October, until Christmas day, when the first case had already developed.

"But I think the most critical examination through the buildings could not raise the suspicion of its origin within them.

"However, its presence in the school being certain, it now remains to be told whether the best precautions have been taken to restrict its spread and whether the facilities for isolating these and other cases, which may follow, are as complete as they should be in a public institution which is the home of three hundred or more children.

"As the enclosed diagram will show, three rooms have been selected in the front of the third story, and in which eleven cases are now being treated.

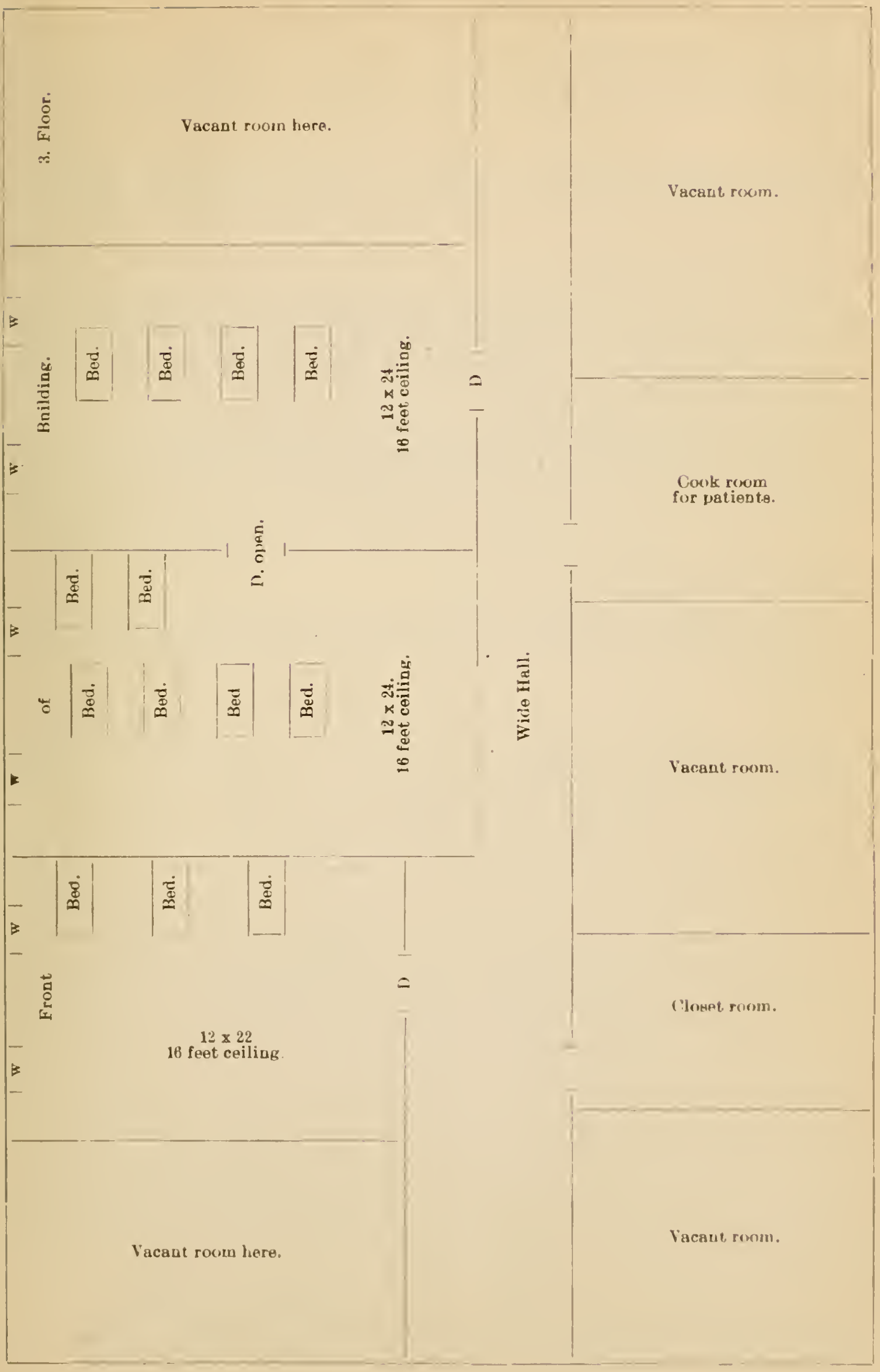
"Two rooms, connected by an open door, contain eight boys, and a third room, separated from the boys, contains three girls.

"No other children occupy rooms on this floor, nor are they allowed to enter its hallways.

"Of course the stairways approaching are open, and permit a limited amount of exchange of air with the floors below, but this is unavoidable under the existing circumstances.

"As fast as the cases have appeared they have been placed in these rooms, to be attended by nurses detailed for the express purpose, and who are not permitted to communicate with other nurses or children below. Bedding and body clothing from these rooms to be washed is first immersed in boiling water containing corrosive sublimate, 1 to 1,000, and then taken below to be steamed and washed separately.

"All excrement and other waste matter fit to pass the closet finds an outlet through this channel, which is across the hall from the rooms occupied by the children, and the closet is frequently treated with antiseptic solutions. Sulphur fumes are used to an efficient degree for antigermicide purposes throughout the premises.


Front of Building. 3. Floor.
Vacant room here.
W
W
W
W
W
W
Bed.
Bed.
Bed.
Bed.
12 x 24
16 feet ceiling.
D
D. open.
Bed.
Bed.
Bed.
Bed.
Bed
Bed.
12 x 24.
16 feet ceiling.
Bed.
Bed.
Bed.
D
12 x 22
16 feet ceiling.
Vacant room here.
Wide Hall.
Vacant room.
Cook room
for patients.
Vacant room.
Closet room.
Vacant room.

"Still another room is kept for suspects, where cases of sickness may be kept until diagnosis is made positive, and where extra precaution is taken to render the contained air and furniture safe against contaminating those who are brought into it.

"The disease in this outbreak seems to be mild in character, and it is believed the exposure has not been general enough to be productive of alarming consequences, but at the same time it serves, however light it may be, to mark the necessity for suitable rooms, isolated from the main buildings, for contagious diseases.

"The entire attendance at the present time is 229, with 90 absent to their homes. The parents and guardians of these absent children have been notified not to return them to the school until notified by the superintendent to do so.

"It is perhaps not just to close this report without pointing out the need of correcting one evil which exists on the grounds of the school.

"Two brick buildings which serve as out closets, one for girls and the other for boys, have been constructed several rods in the rear of the main structure, and each is built directly over the sewer which discharges respectively from the boys' and girls' side of the buildings.

"These buildings are about 12 x 20 feet in size, and have two rows of stalls, facing in opposite directions. The tops of the sewers at these points are left off and the discharges from the occupants are here allowed to fall directly into the open sewer.

"The accommodation in each stall is an ordinary seat-rail in both buildings, and no covers are provided for the openings. In the winter season the warm, moist air from the sewers arises through these openings, becomes condensed by the colder air above, and the result is frost and ice over the sides of the stalls, covering the seat-rail as well, and which is barbarous as well as a menace to the health of the occupants of the buildings.

"This condition, it seems to me, should find a remedy in providing each stall with a separate, improved sanitary closet-basin, having its own trap, the sewers at these points should be closed, and the buildings properly ventilated and warmed in winter.

"There is great need at this institution for hospital rooms for contagious diseases, apart from the other buildings, and it is to be hoped that a recommendation will be made to the next legislature for an appropriation for the purpose of its construction, and that it will find the sanction and support of your Honorable Body.

Very respectfully submitted,

J. W. Hauxhurst.

The following two letters, dated Jan. 18 and 20, respectively, were received at this Office from Supt. Clarke:—

Jan. 18.—"Yours of the 17th received. The 'former cases' were the six reported in that report.

"As to how the first case originated here, we are driven to the conclusion either that it was brought here by visitors, or sent here in the boxes that our pupils so often get from home. We can not trace it to any known exposure.

"Four years ago there were a number of cases of 'German measles' here and it has been suggested that possibly this outbreak might have come from that. The doctor who attended that, is dead, but our matron who was then nurse insists that it was not like this, especially that the rash was different.

"I should be very unwilling to believe that germs could so long live here, in spite of all we do. Besides constant disinfection with sulphate of iron, of all sewers and water closets, and great care to keep our plumbing in order, we always fumigate all the rooms used by the children with burning sulphur, using more than is directed, the last thing before school opens each fall.

"The disease here has been very mild, none of the children have been sick much, and many of them have not been in bed at all.

"Dr. Hauxhurst seems to have brought us good luck, as we have not had a new case since he left. The last case developed on the 11th, and if we do not have another in a few days, I shall feel very hopeful."

Jan. 20:—"I enclose report showing no new cases. The last case was fully developed on Jan. 11th. This outbreak occurred while many of our children were at home. Eighty-eight of them are still there, and their parents are very anxious to have them come back. Do you think, that if we have no other case by today week, Jan. 27th, it will be safe to allow them to do so? The loss of a month in the middle of the school year is a very serious one, and every day makes it more so."

Dr. Baker replied, Jan. 23, 1894, to the above letter as follows:—

"Accept thanks for your weekly report on blank 'M' for the week ending Jan. 20, and for your letter of Jan. 20, relative to scarlet fever.

"Although by Jan. 27, the time of the period of incubation of scarlet fever would be exceeded, counting from the time of the beginning of the last case, yet I think there would be considerable risk in bringing children into the school while there *are still in the same building cases sick or desquamating from scarlet fever.* It is extremely difficult to so guard the movements of every person, and of every current of air, as to ensure that the germs of the disease shall not reach places occupied or visited by susceptible inmates."

The following extract from Supt. Clarke's report in the newspaper, gives further facts in regard to this outbreak. In his final report sent to this Office, Supt. Clarke reports the last case was taken sick March 7, and on April 24, the last case had recovered.

"All of these cases have been very mild. The sickest one was one of the first two, who was in bed for five days. Most of them have not been sick enough to go to bed at all, and not one at any time has been in the least danger. The usual course of the disease has been headache and slight sore throat one day, during which the patient was isolated, but not sent to the hospital for contagious diseases. On the next day the fever began, and frequently the rash also. On the third day the rash came out well and the fever began to abate; and on the fourth day, usually, the fever was all gone, and there only remained the tedious task of staying in quarantine, waiting for the process of 'peeling' to come to an end, for during this time, while the old skin is coming off, sometimes in large patches, and sometimes in minute scales, the doctors hold, that there is the greatest danger of giving the disease to others, and the State Board of Health insists that it is not safe to send children who have not had the Scarlet Fever to a home where there are others still 'peeling.'

"The stairway mentioned in the Doctor's report, has since been partitioned off."

## ESTIMATED NUMBERS OF OUTBREAKS AND CASES OF SCARLET FEVER PREVENTED AND LIVES SAVED BY ISOLATION AND DISINFECTION.

Tables 9 and 10 and the following diagram compare the average numbers of cases and deaths in outbreaks of scarlet fever where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where those measures were neglected.* By Table 10 it may be seen that during the eight years, 1886–93, there were over five times as many cases, and nearly five times as many deaths in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced.

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* *Definition of Outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable disease, an outbreak is considered as the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over sixty days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the latter cases are considered as part of the same outbreak.

In the compilation of the reports for Tables 9 and 10 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed, "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or Disinfection or both not mentioned, or statements doubtful."

By table 9 it may be seen that during the year 1893 there were reported to the office of the State Board of Health 667 outbreaks of scarlet fever, with 5,219 cases and 327 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 8,131 cases and 534 deaths, and taking from these respectively the cases (5,219) and deaths (327) which did occur, leaves 2,912 cases and 207 deaths indicated as prevented in these 667 outbreaks, by isolation and disinfection. By the same method in each year the indicated saving in the 3,748 outbreaks which occurred during the eight years, 1886–93, is 23,258 cases and 1,029 lives.

The above indicates only the lives saved and cases prevented in localities *after the outbreaks had commenced.* But there were many *outbreaks* prevented in the State, for the reason that isolation and disinfection by restricting the number of cases of scarlet fever in the outbreaks which did occur probably in the same proportion prevented the disease from spreading from those localities and starting additional outbreaks in other localities,—there being that proportion less of scarlet fever cases to communicate the disease to persons in the uninfected localities, and the cases which did occur being less likely to communicate the disease than if there had been no measures taken in the State to prevent scarlet fever from spreading. In this way it is believed that the *number of outbreaks* in Michigan during 1893 was restricted in about the same proportion as the *number of cases* in all outbreaks was restricted; that is, about 36 (35.83) per cent, or 375 outbreaks were prevented by isolation and disinfection. Assuming that in these 375 outbreaks the average numbers of cases and deaths per outbreak would have been the same as they averaged in those outbreaks where isolation and disinfection were neglected (12.19 cases and .80 deaths) there is indicated a probable additional saving of about 300 lives and 4,571 cases by preventing *outbreaks* through isolation and disinfection during 1893, making the total indicated saving for the year 507 lives and 7,483 cases. By the same method there is indicated a probable total saving during the eight years, 1886–93, of about 2,930 lives and 65,851 cases, by the measures prescribed by the Michigan State Board of Health,—an average saving of 366 lives and 8,231 cases per annum during the eight years.

TABLE 9.—*Scarlet Fever in Michigan in 1893; Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 667 outbreaks reported; (2) in the 387 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 5 outbreaks in which Disinfection was enforced and Isolation was doubtful; (4) in the 49 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 23 outbreaks in which Isolation was enforced and Disinfection was neglected; (6) in the 19 outbreaks in which Disinfection was enforced and Isolation was neglected; (7) in the 124 outbreaks in which both Isolation and Disinfection were neglected; (8) in the 60 outbreaks in which both Isolation and Disinfection were enforced.*

| | (1) | | (2) | | (3) | | (4) | | (5) | | (6) | | (7) | | (8) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All outbreaks. | | Isolation or Disinfection or both not mentioned, or statements doubtful. | | Disinfection enforced —Isolation doubtful. | | Isolation enforced—Disinfection doubtful. | | Isolation enforced—Disinfection neglected. | | Disinfection enforced —Isolation neglected. | | Isolation and Disinfection both neglected. | | Isolation and Disinfection both enforced. | |
| | (667 outbreaks.*) | | (387 outbreaks.) | | (5 outbreaks.) | | (49 outbreaks.) | | (23 outbreaks.) | | (19 outbreaks.) | | (124 outbreaks.) | | (60 outbreaks.) | |
| | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| Totals ...... | 5,219 | 327 | 3,197 | 204 | 18 | 0 | 149 | 6 | 61 | 2 | 126 | 8 | 1,511 | 99 | 157 | 8 |
| Averages... | 7.82 | 0.49 | 8.20 | 0.53 | 3.60 | 0 | 3.04 | 0.12 | 2.65 | 0.09 | 6.63 | 0.42 | 12.19 | 0.80 | 2.62 | 0.13 |

* These do not include the cases and deaths in Detroit and Grand Rapids because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease is present in some part of the city nearly all the time. See foot-note on page 243.

TABLE 10.—*Exhibiting for the eight Years, and for each of the eight Years, 1886–93, the Numbers of Reported Outbreaks, Cases and Deaths; also for this eight-year Period, the average numbers of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection or both were Doubtful; Isolation and Disinfection both Neglected; Isolation and Disinfection both Enforced; and, also, the Numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.*

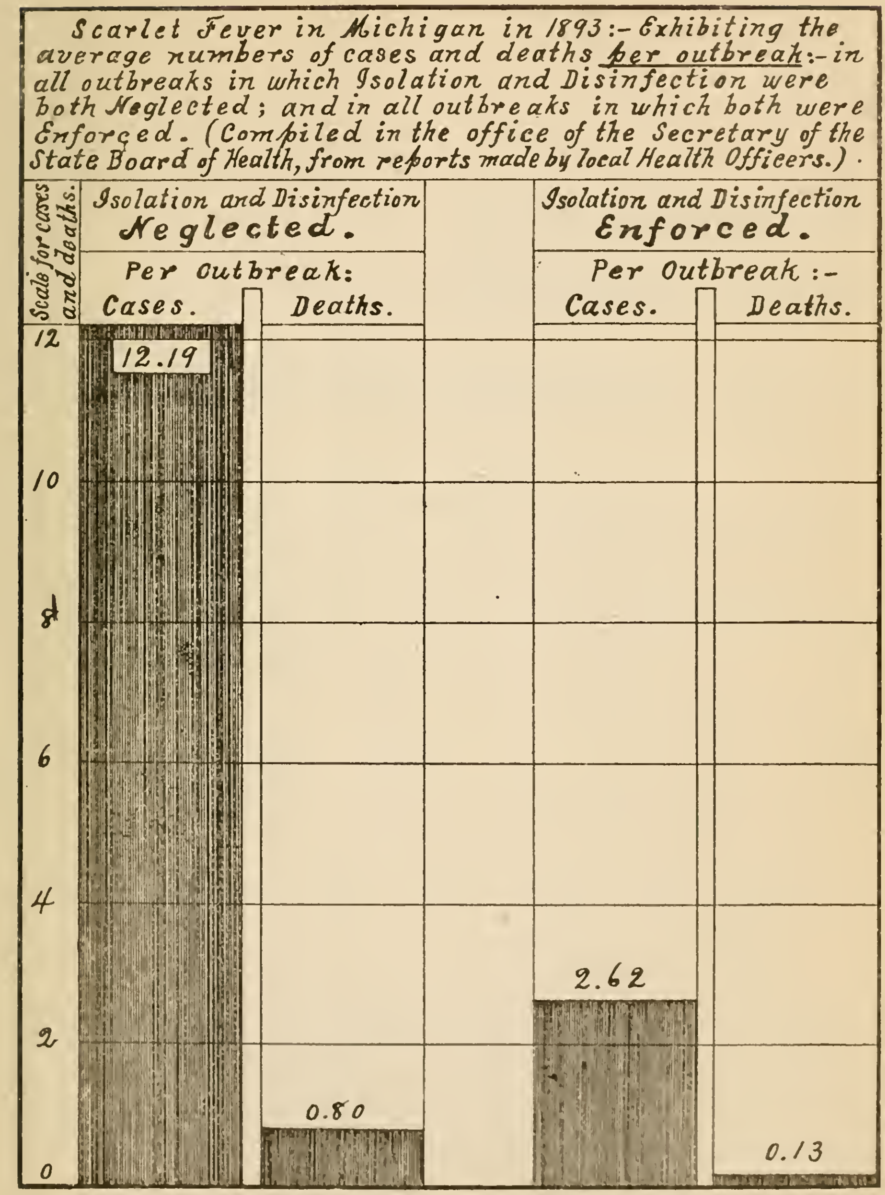
| Years. | All Outbreaks,* | | | Isolation or Disinfection, or both, not Mentioned, or Statements Doubtful. | | | Isolation *and* Disinfection both Neglected. | | | Isolation and Disinfection both Enforced. | | | Cases and Deaths Indicated as having been prevented by Isolat'n and Disinfection. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Outbreaks. | Cases. | Deaths. | Outbreaks. | Cases. | Deaths. | Outbreaks. | Cases. | Deaths. | Outbreaks. | Cases. | Deaths. | Cases. | Deaths. |
| 1886 | 324 | 1,716 | 100 | 221 | 934 | 43 | † 45 | † 623 | † 46 | 58 | 159 | 11 | ‡ 2,768 | ‡ 231 |
| 1887 | 299 | 1,882 | 141 | 190 | 1,200 | 93 | 32 | 440 | 34 | 64 | 148 | 11 | § 2,220 | § 177 |
| 1888 | 340 | 1,838 | 112 | 225 | 955 | 74 | 61 | 724 | 33 | 36 | 80 | 3 | § 2,198 | § 72 |
| 1889 | 417 | 2,822 | 123 | 284 | 1,453 | 61 | 72 | 1,208 | 48 | 52 | 140 | 10 | § 4,175 | § 156 |
| 1890 | 477 | 3,054 | 115 | 302 | 1,711 | 67 | 94 | 1,137 | 36 | 42 | 76 | 1 | § 2,715 | § 66 |
| 1891 | 602 | 4,936 | 193 | 380 | 3,012 | 91 | 141 | 1,701 | 66 | 42 | 107 | 1 | § 2,342 | § 90 |
| 1892 | 622 | 5,240 | 306 | 377 | 2,944 | 188 | 110 | 1,621 | 59 | 42 | 97 | 7 | § 3,928 | § 30 |
| 1893 | 667 | 5,219 | 327 | 337 | 3,197 | 204 | 124 | 1,511 | 99 | 60 | 157 | 8 | § 2,912 | § 207 |
| Totals | 3,748 | 26,707 | 1.417 | 2,866 | 15,406 | 821 | 679 | 8,968 | 421 | 396 | 964 | 52 | 23,258 | 1,029 |
| Averages, eight years | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | 2,907 | 129 |
| Average cases and deaths per outbreak | ........ | 7.13 | 0.38 | ........ | 6.51 | 0.35 | ........ | 13.2 | 0.62 | ........ | 2.43 | 0.13 | ........ | ........ |

* Outbreaks in Detroit and Grand Rapids not included.

† The figures for the first year (1886) in this column are for outbreaks in which "Isolation or Disinfection or both were Neglected,"—outbreaks not having been compiled for the column "Isolation and Disinfection both Neglected" for that year, as there were too few reports of outbreaks which could be thus classified.

‡ These results are obtained by multiplying the total number of outbreaks for the year by the average number of cases (13.84) or deaths (1.02) per outbreak, which is obtained from the column "Isolation *or* Disinfection or both Neglected," and deducting from the results thus obtained the number of cases and deaths which *did* occur in the year 1886.

§ These results are obtained in the same manner as noted in the last foot-note above, except that the averages by which the whole number of outbreaks for each year is multiplied, are obtained from the column "Isolation *and* Disinfection both neglected."



Scarlet Fever in Michigan in 1893:—Exhibiting the average numbers of cases and deaths *per outbreak*:—in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)

[PLATE 774]

### PERIOD OF INCUBATION, IN SCARLET FEVER.

TABLE 11.—*Exhibiting the reported Period of Incubation, stated in days, in 107 cases of Scarlet Fever. Compiled from reports of health officers in Michigan, for the year 1893.*

| Incubation period—Days | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 18 | 20 | 21 | 35 | 56 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cases in each period | 1 | 6 | *3 | †5 | ‡4 | 10 | §24 | ¶8 | 4 | ‖11 | 1 | **7 | 1 | ††14 | 1 | 1 | 2 | 1 | 1 | ‡‡1 | 1 |

* In 2 of these cases it was reported as about 8 days.
† In 1 of these cases it was reported as about 4 days.
‡ In 2 of these cases it was reported as about 5 days.
§ In 2 of these cases it was reported as about 7 days.
¶ In 3 of these cases it was reported as about 8 days.
‖ In 4 of these cases it was reported as about 10 days.
** In 2 of these cases it was reported as about 12 days.
†† In 5 of these cases it was reported as about 14 days.
‡‡ In this case it was reported as about 35 days.

The average of the above 107 reported periods of incubation is about 9.4 days; the greatest number of instances given in any single period was in the 7-days period.

TABLE 12.—*Exhibiting, relative to 22 instances of Scarlet Fever in Michigan in 1893, the Reported Period of Incubation, within certain limits, stated in days; also the Means, the average of which may represent the average Period of Incubation.*

| Days. | Means. | Days. | Means. | Days. | Means. | Days. | Means. |
|---|---|---|---|---|---|---|---|
| 3 to 5 | 4 | 5 to 8 | 6.5 | 7 to 9 | 8. | 10 to 13 | 11.5 |
| 3 to 7 | 5 | 5 to 10 | 7.5 | 7 to 10 | 8.5 | 10 to 14 | 12. |
| 4 to 15 | 9.5 | 5 to 11 | 8. | 7 to 12 | 9.5 | 14 to 21 | 17.5 |
| 5 to 7 | 6 | 6 to 8 | 7. | 7 to 14 | 10.5 | 14 to 28 | 21. |
| 5 to 7 | 6 | 6 to 8 | 7. | 7 to 16 | 11.5 | 15 to 20 | 17.5 |
| 5 to 7 | 6 | 6 to 15 | 10.5 | -------------- | -------------- | -------------- | -------------- |

The average of all the means, for the 22 instances, is 9.5 days.

### AGES OF GREATEST PREVALENCE OF, AND MORTALITY FROM SCARLET FEVER.

In Table 13 are shown the numbers of cases of and deaths from scarlet fever in Michigan in 1893, in which the ages were stated in the health officers' reports. In this table the cases and deaths are arranged in *age-groups*, showing what per cent the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; the per cent the deaths in each group were of the cases in that group, and the per cent the deaths in special groups were of all deaths.

Of the 6,065 cases of scarlet fever reported to this Office for the year 1893, the ages were given in 2,666 instances, and of the 415 deaths reported for the same year, the ages of the decedents were given in 166 instances. As the per cent of deaths per hundred cases is nearly the same in the total numbers reported as in the smaller numbers where the ages were stated (being 6.8 for the total numbers and 6.2 for those where ages were given), evidently those cases and deaths where the ages were stated are fair averages.

By this table (13) it may be seen that the greatest number of cases of scarlet fever occurred in persons under 10 years of age,—75.3 per cent of all cases having occurred in that period of age. The next greatest number of cases occurred in the period of age from 11 to 15 years. From this period the number of cases grade downward, each succeeding period being lower than the preceding.

The greatest number of deaths occurred in the first five-year period, 56 per cent of all the deaths having occurred in that age-period. The next greatest number of deaths occurred in the second five-year period, 6 to 10 years, 27.1 per cent of all deaths having occurred in that age period.

The fourth line of this table shows that with nearly the same number of cases in the first and second five-year periods the per cent of deaths in the first five-year period was double that of the second age period. The largest per cent (14.3) the deaths in any one group were of the cases in that group was in the age period, 41 to 45 years.

Ninety per cent of all the cases in which the age was given occurred in the age period, 0 to 15 years; and ninety-five per cent of deaths in which the age was given occurred in the same period of years.

TABLE 13.—*Exhibiting in certain Age-Groups, the number of Cases and the number of Deaths from Scarlet Fever; the per cent that the cases in each group were of All Cases; the per cent that the Deaths in each group were of All Deaths; and the per cent that the Deaths in each group were of the Cases in that group.—Compiled from all reports for the year 1893 which stated the ages.*

| | Number and per cent of Cases and Deaths in certain Age-groups. | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ages in groups of years | All ages known. | 0–1. | 1–2. | 2–3. | 3–4. | 4–5. | 0–5. | 6–10. | 11–15. | 16–20. | 21–25. | 26–30. | 31–35. | 36–40. | 41–45. | 46 years and over. |
| No. of cases | * 2,666 | 127 | 193 | 235 | 233 | 244 | 1032 | 978 | 399 | 135 | 52 | 29 | 20 | 11 | 7 | 3 |
| Per cent the cases in each group were of all cases | 100 | 4.8 | 7.2 | 8.8 | 8.7 | 9.2 | 38.7 | 36.6 | 15.0 | 5.1 | 2.0 | 1.1 | 0.8 | 0.4 | 0.3 | 0.1 |
| No. of deaths | * 166 | 16 | 19 | 19 | 26 | 13 | 93 | 45 | 20 | 3 | 3 | 1 | 0 | 0 | 1 | 0 |
| Per cent the deaths in each group were of cases in that group | 6.2 | 12.6 | 9.8 | 8.1 | 11.2 | 5.3 | 9.0 | 4.6 | 5.0 | 2.2 | 5.8 | 3.5 | 0 | 0 | 14.3 | 0 |
| Per cent the deaths in each group were of all deaths | 100 | 9.6 | 11.4 | 11.4 | 15.7 | 7.8 | 56.0 | 27.1 | 12.0 | 1.8 | 1.8 | 0.6 | 0 | 0 | 0.6 | 0 |
| Per cent the deaths in special groups were of all deaths | 100 | 56 | | | | | 83.1 | | 15.6 | | | 1.2 | | | | |

* Does not include those cases or deaths where the age was not stated.

TABLE 14.—*Exhibiting in certain Age-Groups, the number of Cases and the number of Deaths from Scarlet Fever in each of the years 1892–93; the per cent that the Cases in each group were of All Cases; the per cent that the Deaths in each group were of all Deaths,—Compiled from all reports for the years 1892–93 which stated the ages.*

| Year. | | Total No. included. | Per Cent of Cases and Deaths in certain Age-groups. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Ages. | 0 to 5. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 35 to 40. | 41 to 45. | 46 Years and over. |
| 1892. | Cases | 2,704 | 100 | 29.1 | 41.4 | 18.7 | 6.1 | 2.2 | 0.9 | 1.0 | 0.4 | 0.1 | 0.1 |
| | Deaths | 128 | 100 | 48.4 | 35.9 | 10.9 | 1.6 | 0.8 | 0 | 1.6 | 0 | 0.8 | 0 |
| 1893. | Cases | 2,666 | 100 | 38.7 | 36.6 | 15.0 | 5.1 | 2.0 | 1.1 | 0.8 | 0.4 | 0.3 | 0.1 |
| | Deaths | 166 | 100 | 56.0 | 27.1 | 12.0 | 1.8 | 1.8 | 0.6 | 0 | 0 | 0.6 | 0 |

TABLE 15.—*Exhibiting in certain age-periods, the number of persons who died from Scarlet Fever in each of the two years 1892-93; also the per cent the deaths in each period were of all the deaths in those two years.*

| Year. | All deaths. | Deaths in certain age-periods.* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 to 5. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. |
| 1892 | 128 | 62 | 46 | 14 | 2 | 1 | 0 | 2 | 0 | 1 |
| 1893 | 166 | 93 | 45 | 20 | 3 | 3 | 1 | 0 | 0 | 1 |
| Both years | 294 | 155 | 91 | 34 | 5 | 4 | 1 | 2 | 0 | 2 |
| Per cent the deaths in both years in each age period were of all deaths in 1892 and 1893† | 100 | 52.7 | 31.0 | 11.6 | 1.7 | 1.4 | .3 | .7 | 0 | .7 |

* In each period the first and last years are included.
† This line is graphically exhibited in the diagram—"Plate 773," page 251.

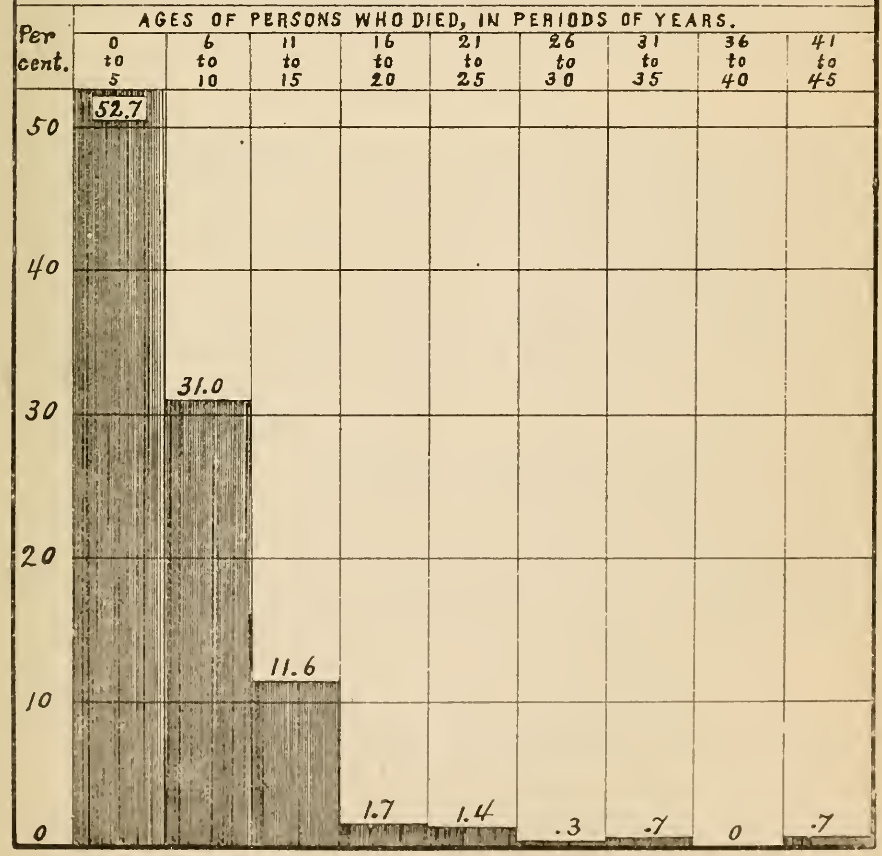
TABLE 16.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups* who recovered from Scarlet Fever in Michigan, during the year 1893; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

| Year. | Sex. | Average age of non-fatal cases. Years. | No. of cases included. | Age.—In Periods of Years. Per cent of Cases in each Period of age. | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | All Ages. | Five years and under. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. | 46 Years and over. |
| 1893. | Males | 7.8 | 1,133 | 100 | 41.3 | 36.4 | 14.1 | 3.6 | 2.2 | 1.1 | 0.5 | 0.5 | 0.9 | 0.2 |
| | Females | 8.7 | 1,367 | 100 | 33.7 | 38.1 | 16.0 | 6.7 | 1.8 | 1.2 | 1.0 | 0.4 | 0.4 | 0.07 |

* The age-groups are five-year periods; the *first* and *last* years are both included.

From Table 16 it may be seen that of the 1,133 males reported to have recovered from scarlet fever in 1893, whose ages were given, 91.8 per cent were sick before reaching the age of 16 years; and of the 1,367 females whose ages were given 87.8 per cent were sick before reaching the same age; that the average age of males who recovered from scarlet fever was 7.8 years and for females was 8.7 years; and that the age of greatest prevalence of the disease was, in males of 5 years old and under; and in females in the over 5 and under 11-year period.

*Diagram.— Exhibiting what per cent of all Deaths from Scarlet Fever were of persons within certain periods of age. In each period, first and last years are included. (Computed from 294 deaths in Michigan during the 2 years, 1892-93*)*



** Compiled from all reports to the Secretary of the State Board of Health, for the years 1892-93, which stated the ages at which persons died of scarlet fever.*

[PLATE 773]

TABLE 17.—*Exhibiting by Sex, the per cent of persons in certain Age-groups* who died from Scarlet Fever in Michigan, during the year 1893; also the average age and the number of deaths included. (Compiled from such reports as stated the ages.)*

| Year. | Sex. | Average age of decedents Years. | No. of Deaths included. | Age.—In Periods of Years. Per Cent of Deaths in each Period of Age.* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | All Ages. | Five Years and under. | 6 to 10 | 11 to 15 | 16 to 20 | 21 to 25 | 26 to 30 | 31 to 35 | 36 to 40 | 41 to 45 | 46 Years and over. |
| 1893. | Males | 5.4 | 73 | 100 | 64.4 | 24.7 | 8.2 | 0 | 1.4 | 1.4 | 0 | 0 | 0 | 0 |
| | Females | 7.1 | 93 | 100 | 49.5 | 29.0 | 15.1 | 3.2 | 2.2 | 0 | 0 | 0 | 1.1 | 0 |

* The age-groups are five-year periods; the *first* and *last* years are both included.

From Table 17 it may be seen that of the 73 males reported to have died from scarlet fever in 1893, and of which the ages were given, 64.4 per cent died before the sixth year of age, and 24.7 died in the second five-year period, from 6 to 10 years. Of the 93 females so reported 49.5 per cent died before the sixth year of age and 29 per cent died in the second five-year period, from 6 to 10 years.

From Table 18 it may be seen that there were 20 more deaths among females than among males during the year 1893 (in the reports where the sex was stated). Nevertheless, the fatality in females was very slightly more than in males,—the former being 6.8 and the latter 6.4 per cent of reported cases.

Table 18 further shows that the greatest number of deaths, in both sexes, occurred in the first five-year age-period.

Beyond the age of 15 years, there were 8 deaths occurred in both sexes (2 males and 6 females) which was less than five per cent of *all* deaths from scarlet fever.

The average age of males who died from scarlet fever in 1893, was 5.4 years; of females, 7.1 years. The average age at which both sexes died was 6.2 years.

TABLE 18.—*Exhibiting, by Sex for each year of Age, and in certain Age-groups,* the number of persons who died from Scarlet Fever during the year 1893, and the per cent the deaths in each Age-group were of deaths at all ages. (Compiled from such reports to the State Board of Health, as stated the sex and age.)*

| Sex. | Ages in Years, and groups of Years. | All ages. | Number and per cent of Deaths by Sex, in certain Age-periods. | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0–5. | | | | | 6–10. | | | | | 11–15. | | | | | 16–20. | | | | | 21 Years and Over. | | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 26 | 42 |
| Males. | No. of Deaths, by single Years | .... | 8 | 8 | 13 | 10 | 8 | 6 | 5 | 4 | 3 | 0 | 2 | 1 | 2 | 0 | 1 | -- | -- | -- | -- | -- | 1 | -- | 1 | .... |
| | No. of Deaths, by Groups of Years | 73 | 47 | | | | | 18 | | | | | 6 | | | | | ............ | | | | | 2 | | | |
| | Per cent the Deaths in each age-group were of the total deaths † among Males | 100 | 64.4 | | | | | 24.7 | | | | | 8.2 | | | | | ............ | | | | | 2.7 | | | |
| | Average age at Death, from Scarlet Fever | 5.4 | | | | | | | | | | | | | | | | | | | | | | | | |
| Females. | No. of Deaths, by single Years | .... | 8 | 11 | 6 | 16 | 5 | 9 | 2 | 6 | 7 | 3 | 3 | 2 | 5 | 3 | 1 | 1 | 2 | -- | -- | -- | 1 | 1 | --- | 1 |
| | No. of Deaths, by Groups of Years | 93 | 46 | | | | | 27 | | | | | 14 | | | | | 3 | | | | | 3 | | | |
| | Per cent the Deaths in each age-group were of the total deaths † among Females | 100 | 49.5 | | | | | 29.0 | | | | | 15.1 | | | | | 3.2 | | | | | 3.2 | | | |
| | Average age at Death, from Scarlet Fever | 7.1 | | | | | | | | | | | | | | | | | | | | | | | | |
| Both Sexes. | No. of Deaths, by single Years | .... | 16 | 19 | 19 | 26 | 13 | 15 | 7 | 10 | 10 | 3 | 5 | 3 | 7 | 3 | 2 | 1 | 2 | -- | -- | -- | 2 | 1 | 1 | 1 |
| | No. of Deaths, by Groups of Years | .... | 93 | | | | | 45 | | | | | 20 | | | | | 3 | | | | | 5 | | | |
| | Per ct. the deaths in each age-group were of the total deaths † in both sexes | 100 | 56.0 | | | | | 27.1 | | | | | 12.0 | | | | | 1.8 | | | | | 3.0 | | | |
| | Average age at Death, from Scarlet Fever | 6.2 | | | | | | | | | | | | | | | | | | | | | | | | |

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* The age-groups are five-year periods; the *first* and *last* years are both included.
† Deaths from Scarlet Fever.

## AVERAGE DURATION OF SCARLET FEVER.—FATAL AND NON-FATAL CASES.

TABLE 19.—*Exhibiting by Sex of patient, the duration (in days) of fatal cases of sickness from Scarlet Fever in Michigan, during the year 1893. Arranged in five-day groups, the first and last days in each group are included. (Compiled from those reports which stated the length of time the patient was sick.)*

| Fatal cases of Scarlet Fever. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | No. of cases included. | Duration of Sickness:—Per cent of Deaths in each Period of Days. | | | | | | | | | | | |
| | | | All cases. | 1 to 5 days. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. | 46 to 50. | 51 days and over. |
| 1893. | Males | 60 | 100 | 38.3 | 28.3 | 8.3 | 8.3 | 10.0 | 2.0 | 2.0 | 0 | 0 | 0 | 3.3 |
| | Females | 82 | 100 | 41.4 | 22.0 | 15.0 | 10.0 | 6.0 | 1.1 | 1.1 | 0 | 2.4 | 0 | 1.1 |

From Table 19 it may be seen that of the 60 males and 82 females who were reported to have died from scarlet fever in 1893, and of which the interval between the day of being taken sick and the day of death was given, the largest per cent died in the period from 1 to 5 days and the next highest per cent died in the period from 6 to 10 days. Sixty-seven per cent of males and 63 per cent of females died before the eleventh day of sickness.

The average duration of sickness for fatal cases in 1893 was 12 days for males and 10 days for females.

TABLE 20.—*Exhibiting by Sex of patient, by per cent of cases which recovered in specified periods of time, the Duration (in days) of Non-Fatal cases of sickness from Scarlet Fever, in Michigan, during the year 1893. Arranged in five-day groups, the first and last days in each group inclusive. (Compiled from those reports which stated the length of time the patient was sick.)*

| Non-Fatal Cases of Scarlet Fever. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | No. of cases included. | Duration of Sickness:—Per Cent of Cases in each Period of Days. | | | | | | | | | | |
| | | | All Periods. | 1 to 5 | 6 to 10 | 11 to 15 | 16 to 20 | 21 to 25 | 26 to 30 | 31 to 35 | 36 to 40 | 41 to 45 | 46 days and over. |
| 1893. | Males | 687 | 100 | 4.8 | 26.8 | 23.0 | 14.0 | 11.6 | 9.0 | 3.8 | 3.5 | 1.6 | 2.0 |
| | Females | 809 | 100 | 4.0 | 24 7 | 24.8 | 16.1 | 10.1 | 11.5 | 3 7 | 1.7 | 2.0 | 1.0 |

From Table 20 it may be seen that in the non-fatal cases of scarlet fever in the year 1893, of which the interval between the day of being taken sick and the day of recovery was given, that 68 per cent of males and 70 per cent of females recovered before the the twenty-first day of sickness.

The average duration of sickness of non-fatal cases of scarlet fever, in 1893, was 17.4 days for males and 17.2 days for females.

# TYPHOID FEVER IN MICHIGAN.—DURING THE YEAR ENDING DECEMBER 31, 1893.

During the year ending December 31, 1893, there were reported to the Secretary of the State Board of Health 545 outbreaks of typhoid fever (includes "typho-malarial") in 504 localities in Michigan in which there were reported to have occurred 3,512 cases and 594 deaths. Notwithstanding the marked improvement which the State Board of Health has succeeded in bringing about both in promptness and accuracy of reports of local health officials to the central office, it is still evident that not all cases of sickness and deaths from typhoid fever are yet reported. For the year 1893 there were reported to the Secretary of State 689* deaths from typhoid fever,—95 more than were reported to this office. The Secretary of the State Board of Health estimates that the deaths reported to the Secretary of State should be increased by about 40 per cent in order to equal the actual number of deaths which occur; according to this estimate there were about 964 deaths from typhoid fever in Michigan during the year 1893, instead of 594 as reported to the office of the State Board of Health.

### TYPHOID FEVER IN 1893 COMPARED WITH PREVIOUS YEARS.

Comparisons with previous years, to ascertain the comparative increase or decrease of the prevalence of typhoid fever in this State, would, no doubt, be interesting and instructive, if there existed a fixed basis on which to found such comparisons; but from year to year there has been a steady improvement, both in the methods adopted by the State Board of Health in securing and compiling reports, and in the efforts made by the local health officials throughout the State to furnish in their reports the information desired by the State Board. It is, therefore, still impossible to determine the exact increase or decrease of prevalence of the disease in this State by comparisons of the numbers of outbreaks of the disease, and the cases and deaths reported to this office year by year. This fact should be borne in mind when referring to Table 1.

Typhoid fever occurs in waves, the principal waves appearing to be about twelve years apart, with one or two minor waves intervening. This may be seen by referring to Table 2 and the accompanying diagram, representing the number of deaths per 100,000 persons living.† The cause for the great rise in typhoid fever in certain years is to be sought for in the fall in the ground water, in wells, etc., as has been pointed out in preceding reports. Possibly also, in filthy places, the extreme dryness of the surface soil may be found to have some causal relation, because the germs are not destroyed at once by drying. Table 2 and the illustrative diagram probably quite accurately represent the annual fluctuations of, though not the total deaths from, typhoid fever in Michigan during the twenty-six years, 1868–93, as the law for collecting and compiling this information in the office of the Secretary of State has remained nearly the same throughout the twenty-five years.

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* These 689 deaths do not include those reported as caused by typho-malarial fever while the 594 reported to this office include those reported as caused by typhoid fever and typho-malarial fever.

† This diagram is printed on page 257.

Tables 1 and 3 of this article show that while there was an increase of about 36 per cent in the reported cases of sickness from typhoid fever in 1893 as compared with 1892, the increase in the reported deaths in the same period was only about 10 per cent. This is apparently due to the large number of cases and small number of deaths which were reported from Ironwood, as shown in the † foot-note to Table 1.

TABLE 1.—TYPHOID FEVER.—*Exhibiting the numbers of Outbreaks, Localities, Cases and Deaths reported for each of the ten years, 1884–93; also for some of those years the average Cases and Deaths per Outbreak, the per cent ratio of Deaths to Cases, and the number of Special Final reports received.*

| Year. | Outbreaks Reported. | Localities Reported. | Cases Reported. | Deaths Reported. | Average Cases per Outbreak. | Average Deaths per Outbreak. | Deaths per 100 Cases. | Final Reports Received. |
|---|---|---|---|---|---|---|---|---|
| 1884 ...... | ............ | 215 | 969 | 290 | ........... | ........... | 27 | .......... |
| 1885 ...... | 218 | 200 | 715 | 194 | 3.28 | .89 | 23 | .......... |
| 1886 ...... | 290 | 282 | 1,194 | 282 | 4.15 | .75 | 18 | 60 |
| 1887 ...... | 335 | 320 | 3,424 | 411 | *7.24 | *1.23 | 17 | 46 |
| 1888 ...... | 316 | 296 | 1,511 | 310 | 4.78 | .98 | 21 | 60 |
| 1889 ..... | 432 | 398 | 2,530 | 402 | †5.17 | †.93 | †18 | 115 |
| 1890 ...... | 330 | 310 | 1,924 | 304 | 5.83 | .92 | 16 | 135 |
| 1891 ...... | 543 | 501 | 4,670 | 697 | 8.60 | 1.28 | 15 | 208 |
| 1892 ...... | 527 | 484 | 2,591 | 538 | 4.92 | 1.02 | 21 | 216 |
| 1893 ...... | 545 | 501 | ‡3,512 | 594 | 6.44 | 1.09 | 17 | 230 |

* The large average number of cases and deaths per outbreak in 1887 is partially accounted for by the fact that in two outbreaks the disease became epidemic, resulting in an aggregate of 535 cases and 73 deaths.

† In computing the average numbers of cases and deaths per outbreak, and the per cent ratio of deaths to cases in 1889, the outbreak at Negaunee, in which 300 cases were reported, is omitted, because the number of deaths which occurred in that outbreak was not reported.

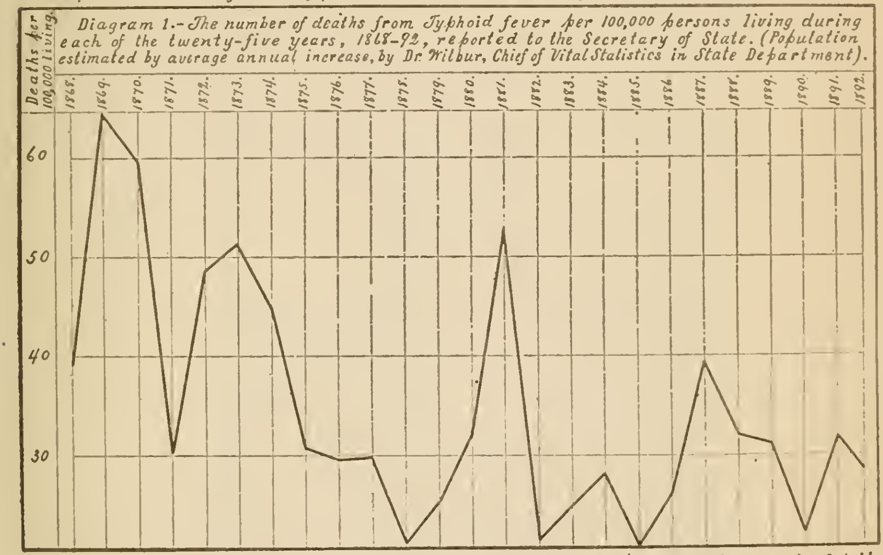
‡ The large number of cases reported in 1893 is easily accounted for by the fact that in Ironwood the disease became epidemic, and the one outbreak resulted in 821 cases and 38 deaths.

TABLE 2.—*Exhibiting the reported number of deaths from Typhoid Fever per 100,000 persons living in Michigan in each of the 26 years, 1868–93. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population estimated by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department.)*

| Year. | 1868. | 1869. | 1870. | 1871. | 1872. | 1873. | 1874. | 1875. | 1876. | 1877. | 1878. | 1879. | 1880. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deaths .............. .. | 39.20 | 64.44 | 59.46 | 30.34 | 48.64 | 51.29 | 44.68 | 30.70 | 29.67 | 29.98 | 21.28 | 25.26 | 32.07 |
| Year. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. | 1892. | 1893. |
| Deaths ................ | 52.66 | 21.41 | 24.92 | 28.41 | 20.85 | 26.22 | 39.40 | 32.06 | 31.15 | 22.21 | 31.97 | 28.65 | 31.25 |

Reference to Tables 1 and 2 of this article, and the comparison of table 3 with a similar table in the article on typhoid fever in 1892 (in the Annual Report of this Board for 1893) shows that the numbers of cases and deaths reported were greater in 1893 than in 1892, yet the fatality was less than in 1892; that is, a less proportion of the reported cases were fatal. Not much importance can be attached to this, however, because so much depends upon methods of reporting cases and deaths; for instance, only fatal cases were reported from Detroit in 1893; but the lessened fatality in 1893 is apparently due to the nature of the epidemic in Ironwood. The death-rate,—that is the ratio of deaths to population—was slightly greater in 1893 than in 1892, as in 1892 there were 2.40 deaths per 10,000 inhabitants, while in 1893 there were 2.69.

*Reported deaths from Typhoid fever, in Michigan, 25 Years, 1868-92.*



*This diagram (1) graphically represents Table 2 which supplies the figures in detail.*

[ Plate 678.]

DISTRIBUTION OF TYPHOID FEVER BY COUNTIES, DURING 1893.

Table 3, and the map, on pages 258 and 259 exhibit, in slightly different ways, the reported typhoid fever, by counties, in Michigan during the year 1893.

The greatest sickness-rate from this disease in 1893 was in Gogebic county, where the ratio of cases to population was 677.8 per 10,000. The sickness-rates of several other counties were largely in excess of the average rate for the whole State, they being as follows:—Marquette 57.1, Missaukee 35.5, Dickinson 33.2, Kent 32.0, Clare 29.2, Gladwin 23.3, Roscommon 22.8, and Baraga 22.6 per 10,000 persons living in those counties; whereas the average sickness-rate for the State was only 15.93 per same number of inhabitants.

From the following eight counties, having an aggregate population of 42,255 there was no typhoid fever reported during the year: Alcona, Alpena, Alger, Charlevoix, Crawford, Manitou, Montmorency and Oscoda.

TABLE 3.—*Numbers of Cases and Deaths reported from Typhoid Fever per 10,000 persons living in each county in Michigan during the year 1893. (Compiled from reports of health officers, clerks, etc.)*

| Counties. | Estimated* population of Michigan for 1893. | Number of reported | | Number per 10,000 population, of | |
|---|---|---|---|---|---|
| | | Cases. | Deaths. | Cases. | Deaths. |
| State | 2,204,563 | 3,512 | 591 | 15.93 | 2.69 |
| Alcona | 5,411 | 0 | 0 | 0 | 0 |
| Alger | 1,348 | 0 | 0 | 0 | 0 |
| Allegan | 39,129 | 33 | 11 | 8.4 | 2.8 |
| Alpena | 17,182 | 0 | 0 | 0 | 0 |
| Antrim | 11,924 | 23 | 2 | 19.3 | 1.7 |
| Arenac | 6,627 | 3 | 0 | 4.5 | 0 |
| Baraga | 3,933 | 9 | 0 | 22 6 | 0 |
| Barry | 23,720 | 32 | 4 | 13.5 | 1.7 |
| Bay | 60,072 | 19 | 14 | 3.2 | 2.3 |
| Benzie | 7,354 | 6 | 1 | 8.2 | 1.4 |
| Berrien | 44,542 | 52 | 10 | 11.7 | 2 2 |
| Branch | 26,351 | 52 | 10 | 19.8 | 3.8 |
| Calhoun | 46,479 | 59 | 16 | 12.7 | 3.4 |
| Cass | 21,120 | 19 | 4 | 9. | 1.9 |
| Charlevoix | 10,620 | 0 | 0 | 0 | 0 |
| Cheboygan | 13,419 | 29 | 5 | 21.6 | 3.7 |
| Chippewa | 14,494 | 17 | 10 | 11.7 | 6 7 |
| Clare | 7,871 | 23 | 2 | 29.2 | 2.5 |
| Clinton | 26,324 | 21 | 2 | 8 | 0.8 |
| Crawford | 2,773 | 0 | 0 | 0 | 0 |
| Delta | 18,277 | 33 | 10 | 18.1 | 5 5 |
| Dickinson | 14,774 | 49 | 8 | 33.2 | 5.4 |
| Eaton | 32,483 | 11 | 1 | 3.4 | 0.3 |
| Emmet | 9,975 | 12 | 3 | 12. | 3.0 |
| Genesee | 40,270 | 15 | 4 | 3.7 | 1.0 |
| Gladwin | 4,727 | 11 | 0 | 23.3 | 0 |
| Gogebic | 13,854 | 939 | 45 | 677.8 | 32.5 |
| Gd. Traverse | 16,474 | 12 | 7 | 7.3 | 4.2 |
| Gratiot | 28,745 | 38 | 5 | 13.2 | 1.7 |
| Hillsdale | 30,368 | 11 | 0 | 3.6 | 0 |
| Houghton | 41,978 | 131 | 16 | 31. | 3.8 |
| Huron | 31,323 | 38 | 3 | 12.1 | 1.0 |
| Ingham | 39,183 | 36 | 8 | 9.2 | 2.0 |
| Ionia | 34,313 | 31 | 14 | 9.0 | 4.0 |
| Iosco | 13,060 | 1 | 0 | 0.8 | 0 |
| Iron | 4,974 | 10 | 2 | 20.1 | 4 |
| Isabella | 20,775 | 17 | 4 | 8.2 | 1.9 |
| Isle Royal | --------- | ---- | --- | ------ | ---- |
| Jackson | 46,153 | 41 | 15 | 8 9 | 3.3 |
| Kalamazoo | 41,360 | 81 | 10 | 19.6 | 2.4 |
| Kalkaska | 5 518 | 8 | 1 | 11.5 | 1.8 |
| Kent | 118,920 | 381 | 74 | 32.0 | 6.2 |
| Keweenaw | 2,827 | 6 | 0 | 21.2 | 0 |
| Lake | 6,048 | 5 | 0 | 8.3 | 0 |
| Lapeer | 28,959 | 15 | 5 | 5.2 | 1.7 |
| Leelanaw | 9,032 | 4 | 2 | 4.4 | 2.2 |
| Lenawee | 48,518 | 73 | 6 | 15.0 | 1.2 |
| Livingston | 20,541 | 11 | 2 | 5.4 | 1.0 |
| Luce | 2,375 | 1 | 0 | 4.2 | 0 |
| Mackinac | 7,385 | 7 | 0 | 9.5 | 0 |
| Macomb | 32,240 | 7 | 4 | 2.2 | 1.2 |
| Manistee | 25,642 | 2 | 0 | .8 | 0 |
| Manitou | 903 | 0 | 0 | 0 | 0 |
| Marquette | 38,004 | 217 | 26 | 57.1 | 6.8 |
| Mason | 17,910 | 11 | 5 | 6.1 | 2.8 |
| Mecosta | 20,472 | 28 | 6 | 13.7 | 2 9 |
| Menominee | 22,945 | 43 | 8 | 18.7 | 3.5 |
| Midland | 12,582 | 19 | 1 | 15.1 | 0.8 |
| Missaukee | 6,479 | 23 | 7 | 35.5 | 10.8 |
| Monroe | 32,969 | 31 | 4 | 9.4 | 1.2 |
| Montcalm | 33,776 | 34 | 6 | 10.0 | 1.8 |
| Montmorency | 2,198 | 0 | 0 | 0 | 0 |
| Muskegon | 37,996 | 20 | 6 | 5.3 | 1.6 |
| Newaygo | 19,462 | 9 | 3 | 4.6 | 1.5 |
| Oakland | 42,312 | 21 | 4 | 5.0 | 1.0 |
| Oceana | 16,372 | 16 | 2 | 9.8 | 1.2 |
| Ogemaw | 5,623 | 2 | 0 | 3.6 | 0 |
| Ontonagon | 6,094 | 4 | 0 | 6.6 | 0 |
| Osceola | 16,014 | 5 | 1 | 3.1 | 0.6 |
| Oscoda | 1,829 | 0 | 0 | 0 | 0 |
| Otsego | 4,664 | 3 | 0 | 6.4 | 0 |
| Ottawa | 38,146 | 21 | 6 | 5.5 | 1.6 |
| Presque Isle | 5,604 | 2 | 0 | 3.6 | 0 |
| Roscommon | 1,751 | 4 | 2 | 22.8 | 11.4 |
| Saginaw | 81,949 | 82 | 21 | 10.0 | 2.6 |
| Sanilac | 33,605 | 45 | 4 | 13.4 | 1.2 |
| Schoolcraft | 6,800 | 11 | 2 | 16.2 | 2.9 |
| Shiawassee | 32,358 | 43 | 4 | 13.3 | 1.2 |
| St. Clair | 53,763 | 108 | 17 | 20.1 | 3.2 |
| St. Joseph | 25,154 | 22 | 5 | 8.7 | 2.0 |
| Tuscola | 33,935 | 27 | 2 | 8.0 | 0.5 |
| Van Buren | 30,920 | 34 | 4 | 11.0 | 1.3 |
| Washtenaw | 43,171 | 25 | 4 | 5.8 | 0.9 |
| Wayne | 283,650 | 156 | 99 | 5.5 | 3.5 |
| Wexford | 13,355 | 12 | 5 | 9. | 3.7 |

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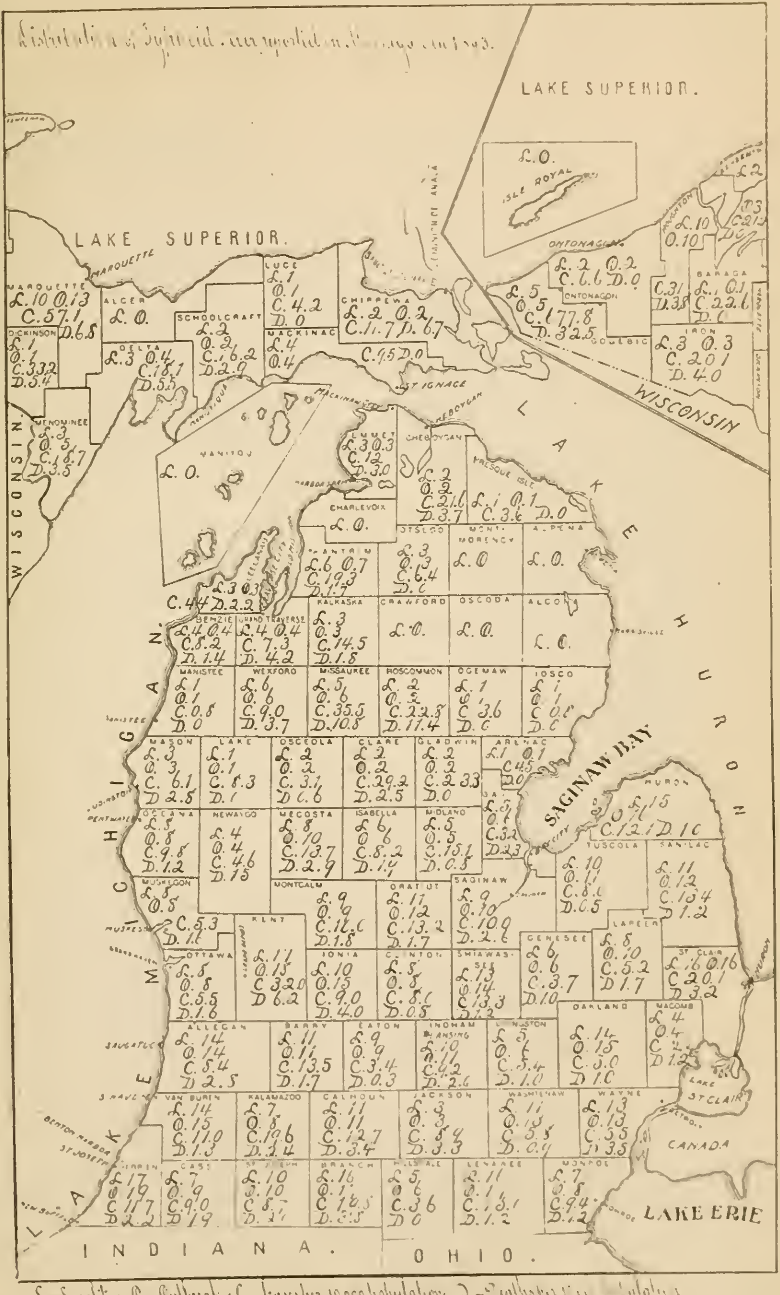
* By Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan "State Department." (Computed by arithmetical method, average annual increase, based on United States census of 1890 and State census of 1894).

DISTRIBUTION OF TYPHOID FEVER IN MICHIGAN IN 1893.
BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS.


Distribution of Typhoid Fever as reported in Michigan in 1893.
LAKE SUPERIOR.
L.0. ISLE ROYAL
KEWEENAW L.2
HOUGHTON L.10 O.10
O.3 C.21 D.0
ONTONAGON L.2 O.2 C.6.6 D.0
L.5 O.5 C.177.8 D.32.5
GOGEBIC
C.31 D.38
BARAGA L.1 O.1 C.22.6 D.0
IRON L.3 O.3 C.20.1 D.4.0
WISCONSIN
LAKE SUPERIOR.
MARQUETTE
MARQUETTE L.10 O.13 C.57.1 D.6.8
ALGER L.0.
LUCE L.1 O.1 C.4.2 D.0
CHIPPEWA L.2 O.2 C.11.7 D.6.7
SCHOOLCRAFT L.2 O.2 C.16.2 D.2.9
MACKINAC L.4 O.4 C.9.5 D.0
DICKINSON L.1 O.1 C.33.2 D.5.4
DELTA L.3 O.4 C.18.1 D.5.5
MENOMINEE L.3 O.5 C.18.7 D.3.5
WISCONSIN.
ST IGNACE
MACKINAW CITY
CHEBOYGAN
MANITOU L.0.
EMMET L.3 O.3 C.12 D.3.0
HARBOR SPRINGS
CHEBOYGAN L.2 O.2 C.21.6 D.3.7
PRESQUE ISLE L.1 O.1 C.3.6 D.0
CHARLEVOIX L.0.
LAKE
ANTRIM L.6 O.7 C.19.3 D.1.7
OTSEGO L.3 O.3 C.6.4 D.0
MONTMORENCY L.0
ALPENA L.0.
LEELANAU L.3 O.3 C.44 D.2.2
TRAVERSE CITY
BENZIE L.4 O.4 C.8.2 D.1.4
GRAND TRAVERSE L.4 O.4 C.7.3 D.4.2
KALKASKA L.3 O.3 C.14.5 D.1.8
CRAWFORD L.0.
OSCODA L.0.
ALCONA L.0.
MANISTEE L.1 O.1 C.0.8 D.0
WEXFORD L.6 O.6 C.9.0 D.3.7
MISSAUKEE L.5 O.6 C.35.5 D.10.8
ROSCOMMON L.2 O.2 C.22.8 D.11.4
OGEMAW L.1 O.1 C.3.6 D.0
IOSCO L.1 O.1 C.0.8 D.0
MANISTEE
MASON L.3 O.3 C.6.1 D.2.8
LAKE L.1 O.1 C.8.3 D.1
OSCEOLA L.2 O.2 C.3.1 D.0.6
CLARE L.2 O.2 C.29.2 D.2.5
GLADWIN L.2 O.2 C.23.3 D.0
ARENAC L.1 O.1 C.4.5 D.0
SAGINAW BAY
HURON L.15 O.11 C.12.1 D.1.0
LUDINGTON
PENTWATER
OCEANA L.8 O.8 C.9.8 D.1.2
NEWAYGO L.4 O.4 C.4.6 D.1.5
MECOSTA L.8 O.10 C.13.7 D.2.9
ISABELLA L.6 O.6 C.8.2 D.1.4
MIDLAND L.5 O.5 C.15.1 D.0.5
BAY L.5 O.6 C.32 D.2.3
BAY CITY
TUSCOLA L.10 O.11 C.8.0 D.0.5
SANILAC L.11 O.12 C.13.4 D.1.2
MUSKEGON L.8 O.8 C.5.3 D.1.6
MUSKEGON
MONTCALM L.9 O.9 C.12.0 D.1.8
GRATIOT L.11 O.12 C.13.2 D.1.7
SAGINAW L.9 O.10 C.10.9 D.2.6
GRAND HAVEN
GENESEE L.6 O.6 C.3.7 D.1.0
LAPEER L.8 O.10 C.5.2 D.1.7
OTTAWA L.8 O.8 C.5.5 D.1.6
KENT L.11 O.15 C.32.0 D.6.2
GRAND RAPIDS
IONIA L.10 O.15 C.9.0 D.4.0
CLINTON L.8 O.8 C.8.6 D.0.8
SHIAWASSEE L.13 O.14 C.13.3 D.1.3
ST CLAIR L.16 O.16 C.20.1 D.3.2
PORT HURON
OAKLAND L.14 O.15 C.5.0 D.1.0
MACOMB L.4 O.4 C.2.4 D.1.2
SAUGATUCK
ALLEGAN L.14 O.14 C.8.4 D.2.5
BARRY L.11 O.11 C.13.5 D.1.7
EATON L.9 O.9 C.3.4 D.0.3
INGHAM LANSING L.10 O.11 C.9.2 D.2.6
LIVINGSTON L.5 O.6 C.5.4 D.1.0
LAKE ST CLAIR
SOUTH HAVEN
VAN BUREN L.14 O.15 C.11.0 D.1.3
KALAMAZOO L.7 O.8 C.19.6 D.2.4
CALHOUN L.11 O.11 C.12.7 D.3.4
JACKSON L.3 O.3 C.5.4 D.3.3
WASHTENAW L.11 O.13 C.5.5 D.0.9
WAYNE L.13 O.13 C.5.5 D.3.5
DETROIT
CANADA
BENTON HARBOR
ST JOSEPH
NEW BUFFALO
BERRIEN L.17 O.19 C.11.7 D.2.2
CASS L.7 O.9 C.9.0 D.1.9
ST JOSEPH L.10 O.10 C.8.7 D.2.1
BRANCH L.16 O.17 C.18.5 D.3.5
HILLSDALE L.5 O.6 C.3.6 D.0
LENAWEE L.11 O.11 C.13.1 D.1.2
MONROE L.7 O.8 C.9.4 D.1.2
MONROE
LAKE ERIE
LAKE MICHIGAN
LAKE HURON
INDIANA.
OHIO.

L. – Localities; O. – Outbreaks; C. – Cases per 10 000 population. D. – Deaths per 10 000 population

"PLATE 784."

TABLE 4.—*Exhibiting the Estimated Population of Michigan for the year 1893, by tiers of counties (Upper Peninsula as one tier); also the number of cases of Typhoid Fever* REPORTED *from each of these divisions for 1893, and the number of cases per 10,000 estimated population of each division.*

| Counties in Groups, most Northern ones First. | | Estimated Population, 1893.* | Reported Cases of Typhoid Fever, 1893. | Reported Cases per 10,000 of Population. |
|---|---|---|---|---|
| State | | 2,204,563 | 3,512 | 15.9 |
| Upper Peninsula | Alger. Mackinac. Houghton. Marquette.<br>Delta. Chippewa. Ontonagon. Iron.<br>Schoolcraft. Isle Royal. Gogebic. Menominee.<br>Luce. Keweenaw. Baraga. Dickinson. | 200,062 | 1,477 | 73.8 |
| Eleventh tier of counties | Maniton.<br>Emmet.<br>Charlevoix.<br>Cheboygan.<br>Presque Isle. | 40,521 | 43 | 10.6 |
| Tenth tier of counties | Leelanaw.<br>Antrim.<br>Otsego.<br>Montmorency.<br>Alpena. | 45,000 | 30 | 6.7 |
| Ninth tier of counties | Benzie.<br>G'd Traverse.<br>Kalkaska.<br>Crawford.<br>Oscoda.<br>Alcona. | 39,859 | 26 | 6.6 |
| Eighth tier of counties | Manistee.<br>Wexford.<br>Missaukee.<br>Roscommon.<br>Ogemaw.<br>Iosco. | 65,910 | 44 | 6.7 |
| Seventh tier of counties | Mason.<br>Lake.<br>Osceola.<br>Clare.<br>Gladwin.<br>Bay.<br>Huron.<br>Arenac. | 150,619 | 115 | 7.6 |
| Sixth tier of counties | Oceana.<br>Newaygo.<br>Mecosta.<br>Isabella.<br>Midland. | 89,663 | 89 | 9.9 |
| Fifth tier of counties | Muskegon.<br>Montcalm.<br>Gratiot.<br>Saginaw.<br>Tuscola.<br>Sanilac. | 250,006 | 246 | 9.8 |
| Fourth tier of counties | Ottawa.<br>Kent.<br>Ionia.<br>Clinton.<br>Shiawassee.<br>Genesee.<br>Lapeer.<br>St. Clair. | 373,053 | 635 | 17.0 |
| Third tier of counties | Allegan.<br>Barry.<br>Eaton.<br>Ingham.<br>Livingston.<br>Oakland.<br>Macomb. | 229,608 | 151 | 6.6 |
| Second tier of counties | Van Buren.<br>Kalamazoo.<br>Calhoun.<br>Jackson.<br>Washtenaw.<br>Wayne. | 491,743 | 396 | 8.1 |
| First tier of counties | Berrien.<br>Cass.<br>St. Joseph.<br>Branch.<br>Hillsdale.<br>Lenawee.<br>Monroe. | 229,022 | 260 | 11.4 |

* Taken from Vital Statistics of Michigan (Registration Report 1891, pp. 16-18.) See foot note to Table 3 of this article.

Considering the State by tiers of counties, Table 4 shows that the greatest prevalence of typhoid fever was in the upper-peninsula tier, where the sickness-rate reached 73.8 cases per 10,000 inhabitants; and that the least prevalence was in the ninth and third tiers, where the sickness-rate was only 6.6 cases. The sickness-rate in the fourth tier, though not so high as that in the upper peninsula, was slightly higher than the average rate for the State.

Typhoid fever being, in 1893, 57.9 per cent more prevalent in the upper peninsula than the average prevalence for the whole State, and 56.8 per cent greater than for any other tier of counties, the question may arise, why this preponderence of prevalence of typhoid fever in the upper peninsula over that of any other part of the State? The fact may perhaps be attributable to the combined influence of several causes, and from the reports of the health officers it would seem that: (1.) That part of the country being comparatively new and hurriedly settled, the disposal of excreta has not received the attention it should have received. This is an important factor in the history of typhoid fever in many portions of the upper peninsula. (2.) A large part of the population is foreign-born, and many of the immigrants who settle in the upper peninsula are uninstructed in sanitary requirements, consequently the disinfection of bowel discharges of typhoid patients is neglected, infected excreta is thrown into privy vaults, and eventually leaches into the wells, and thus the disease is spread. (3.) In the upper peninsula there is little rural population, the inhabitants are chiefly massed in the small cities, villages, and "mine locations," many of the inhabitants are huddled together in crowded places, where the privies and wells are in close proximity, the common people are often unable to read the English language, and sometimes unable to understand the instructions given to them for the prevention of disease, thus typhoid fever spreads easily, and local health officers find it difficult to restrict the disease.

But there is another reason not reported by local health officers why the upper peninsula has suffered from typhoid fever, not only in 1893, but generally. That is the general recklessness of the dominant classes of the people as to private and public water supplies. At Marquette, for many years, the intake of the public water supply was only a few rods from a partially confined sewage-contaminated body of water inside a break-water, through which the infected water not infrequently rushed in intermittent torrents out towards the intake. At Negaunee the public water-supply has been from a small lake into which the drainage of mines is pumped, the intake pipe of the city water-supply being, at some seasons of the year, the only outlet to the lake. At Baraga the intake pipe of the general water-supply was quite near the outlets of the sewers and drains of the village. At Ironwood (where in 1893 there were 824 cases and 38 deaths from typhoid fever), in addition to the causes mentioned above as learned from the health officers, the general water-supply was from a small, unclean river; but the starting of the epidemic is believed to have been due to the contamination of the general water-supply by filth from about a privy washed into a small reservoir at a time of unusual freshet, the reservoir being on low ground near the river bank, and a hole having been made in its side nearest the privy for the admission of water to pump for the general use of the city.

### *Typhoid Fever Spreads Most in Thickly-Inhabited Places.*

That typhoid fever does spread more in centers of population than in the rural districts, seems to be demonstrated by the following instances, taken from the compilation of reports of health officers for the year 1893: In Cheboygan county 29 cases were reported, all of which were in the two cities, Cheboygan and Mackinac; in Dickinson county the 49 cases were all in Iron Mountain; in Gogebic county, of the 939 cases, only two were in rural districts; in Kalamazoo county, out of 81 cases, 61 were in the city of Kalamazoo, leaving only 20 cases in the county outside of the city. The sickness-rate per 10,000 inhabitants in the city of Kalamazoo was 29.2, while in the county outside of the city it was only 10. In Kent county, 356 of the 381 cases were in the city of Grand Rapids, leaving only 25 cases in Kent county outside of the city, a sickness-rate, per 10,000 population, of only 5.8, while in the city of Grand Rapids it was 44.8.

### *Typhoid Fever is Spread from Thickly-Inhabited Places.*

Table 7 and accompanying map demonstrate that the spread of typhoid fever was much greater from the closely-settled centers of population than from the rural localities. The reasons for this fact probably are: That in those cities and villages in which there is not yet a general water-supply from a good source, typhoid fever is most prevalent, business and social intercourse is more frequent and common, greater numbers of persons use water from a common source, which if contaminated with typhoid fever germs, may spread the disease broadcast. With these conditions existing in the cities and villages and the constant travel to and from them, the danger of carrying infection is much greater than from the rural or country district, where the drinking water is usually obtained from a well which supplies one family, transient visitors are comparatively rare, and should the disease break out in an isolated district, extensive spread of the disease does not occur from the lack of favorable opportunity, such as drinking contaminated water and then going away and giving the disease chance to develop elsewhere. Examples of the truth of this statement may be found in Table 7 and the accompanying map illustrating it: Of the localities from which typhoid was spread into Michigan from "Outside the State," with one exception only, large cities are stated as being the source. Chicago was reported to have been the source, in 10 instances, from which there resulted 14 cases with 2 deaths. Of the 10 localities so infected from Chicago, 6 were rural districts, but there was no further spread of the disease from any of them. Duluth, Minn., and Milwaukee, Wis., were each in two instances, reported as having been the source of Michigan cases of typhoid fever. The direct result of the infection of the two localities from Duluth was only 2 cases, but from one of the localities so infected (hence indirectly from Duluth), the disease spread in one instance, with a result of 4 cases. Of the 12 localities, outside of this State, from which typhoid fever was spread into Michigan, not one of them was reported as coming from a rural district. From Gogebic county the only locality from which typhoid fever spread was the city of Ironwood, from which the disease was carried to 4 different localities. From Kent county, 12 instances were reported in which typhoid fever was spread into other localities, 11 of which were from the city of Grand Rapids, and only one from a comparatively isolated locality. Of the five instances in which typhoid fever spread from St. Clair county, 4 were from the city of Port Huron, and 1 from a rural district.

Of the 54 localities, within and without this State, from which typhoid fever was spread in Michigan in 1893 (Table 7), 36 were cities or villages, 12 were rural districts, and 6 were not specified; from the 36 cities or villages from which typhoid fever spread, 64 localities were directly infected; and from the 12 rural districts 19 localities were directly infected. From the localities which were infected from the first ones, 8 other localities were infected, 5 of them being from cities and 3 from rural districts.

## TYPHOID FEVER IN EACH MONTH OF THE YEAR 1893.

TABLE 5.—*Exhibiting the reported number of outbreaks of Typhoid Fever which Began, the number which Ended, and the number of outbreaks which were Present, in each Month of the Year 1893, in the different local jurisdictions of Michigan.*

| Outbreaks. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Outbreaks began..... | 38 | 13 | 14 | 16 | 15 | 38 | 34 | 76 | 94 | 70 | 37 | 24 | 469 |
| Outbreaks ended.. .. | 2 | 8 | 5 | 8 | 7 | 8 | 12 | 15 | 26 | 47 | 69 | 58 | 265 |
| Outbreaks present.... | 39 | 36 | 36 | 38 | 38 | 64 | 80 | 135 | 187 | 201 | 170 | 107 | ...... |

The last line of figures, in Table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the time of the beginning of an outbreak is reported, but the time of the ending of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 204 more beginnings than endings, of outbreaks, reported during the year 1893.

TABLE 6.—*Exhibiting the Number and Per Cent of cases of Typhoid Fever in Michigan in each Month during the Year 1893. (Includes each case for which the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of cases sick in any part of the month ........ | 95 | 101 | 141 | 109 | 177 | 389 | 560 | 603 | 816 | 850 | 616 | 362 |
| Per cent the cases sick in each month were of total reported cases............. | 3 | 3 | 4 | 3 | 5 | 11 | 16 | 17 | 23 | 24 | 18 | 10 |

The first line of figures in Table 6 shows the number of cases reported sick in any part of each month. As some of the cases were sick longer than one month, they are included in the cases sick in more than one month, therefore the sum of the cases sick in all the months exceeds the total of reported cases in 1893; and as the last line of figures in this table shows the per cent the cases sick in each month were of the exact number of cases *reported* to this office in 1893, the sum of the figures in the last line of the table exceed 100.

## SOURCE OF CONTAGIUM OF TYPHOID FEVER.

EXHIBIT I.—*The reported "Source of Contagium" of Cases of Typhoid Fever in Michigan during the year 1893.*

| Reported Sources. | Cases. |
|---|---|
| Traced to former cases* | 155 |
| Probably traced to former cases | 13 |
| Attributed to infected, contaminated, or surface water | 1,401 |
| Cases reported as coming from outside jurisdictions† | 198 |
| Attributed to defective sewerage, or drainage | 19 |
| Attributed to filthy or unsanitary conditions | 44 |
| Attributed to going in swimming, and going in water | 2 |
| Attributed to malaria | 8 |
| Attributed to taking cold | 5 |
| Cases reported as "sporadic" | 5 |
| Cases, the sources of contagium of which were reported as unknown | 347 |
| Cases, the sources of contagium of which were not reported, or the statements were too indefinite for classification | 1,306 |
| Attributed to overwork and exposure | 9 |
| Total | 3,512 |

* Details of some of these instances, in which the disease came from without the jurisdiction, are stated in the text under the sub-head "Typhoid Fever Traced to former Cases in Distant Places."

† Details of some of these instances may be seen under the sub-head "Typhoid Fever Traced to Outside Jurisdictions."

### *Typhoid Fever Traced to Former Cases in Distant Places.*

On a subsequent page (in paragraphs numbered as in Table 7) are examples of "Typhoid fever traced to outside jurisdictions," in which instances the disease was not traced directly to a preceding case; the following are representative statements from the reports of some of the health officers, who were able to trace cases of typhoid fever in their respective jurisdictions to cases of the disease outside of their jurisdictions,—with the source of the disease and the name of the health officer, and of his jurisdiction:—

"Were visiting a sister sick with fever at Sand Beach." *Louis Fleckenstein, M. D., Port Hope village, Huron Co.*

"By contact with a patient with fever at Lowell, Mich." *J. W. Decker. M. D., Lake City, Missaukee Co.*

"From cases near Fowlerville." *C. B. Pearson, M. D., Mundy Tp., Genesee Co.*

"It was brought here from Chicago," "By caring for the one sick, by drinking from the same glass before they called a physician." *S. O. Turbett, M. D., Health Officer, Palmyra Tp., Lenawee Co.*

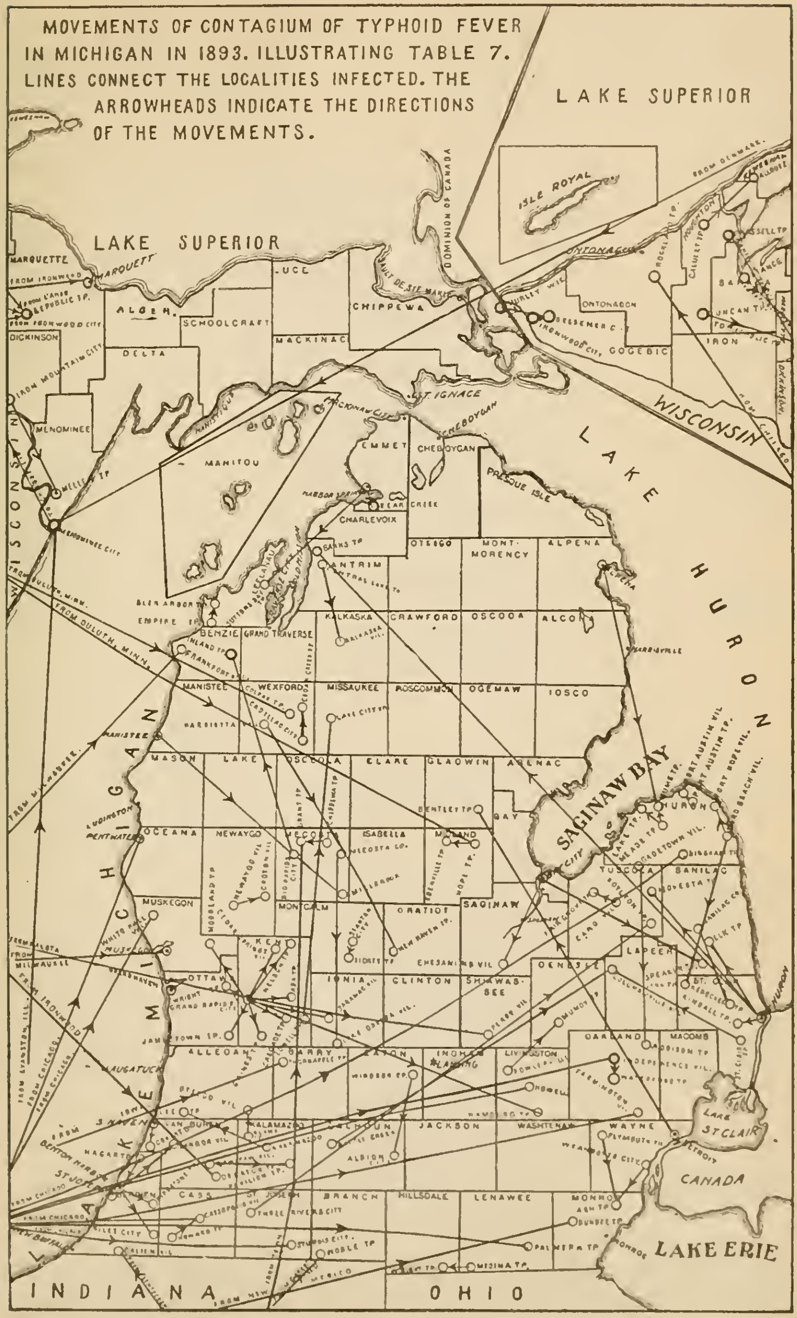
"From attending patient in Independence." *Elsworth Orton, M. D., Waterford Tp., Oakland Co.*

"By taking care of another patient at Wyandotte." *Stanley A. Dupaul, M. D., Ash Tp., Monroe Co.*

"The patient contracted the fever while taking care of her husband at her home in Hope, our neighboring town. He contracted it while in the woods away north of Duluth. Minn." *Dr. C. J. Annis, Heath Officer, Edenville Tp., Midland Co.*

"First case caught in a lumber camp where they had 5 cases, the others caught from the first case.' *James White, Health Officer, Denton Tp., Roscommon Co.*

# MOVEMENTS OF CONTAGIUM OF TYPHOID FEVER IN 1893.



[Plate 7-6.]

TABLE 7.—*First, second and third Localities, where the second Locality was infected with Typhoid Fever from the first, and the third was infected from the second; and the numbers of Cases and Deaths from Typhoid Fever in the first, second and third Localities, with the dates of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

| Number.† | First Localities from which Typhoid Fever spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 1 | Allegan county:<br>Otsego village | * | ---- | Kalamazoo county:<br>Alamo township<br>(Sept. 10–Dec. 1.) | 7 | 2 | | | |
| 2 | Alpena county:<br>Alpena city | * | ---- | Huron county:<br>Hume township<br>(Oct. 2–Nov. 4.) | 1 | 0 | | | |
| 3 | Antrim county:<br>Central Lake twp.<br>(Feb. —.) | 1 | 0 | Kalkaska county:<br>Kalkaska village<br>(June–July.) | 1 | 1 | | | |
| 4 | Baraga county:<br>L'Anse | * | ---- | Marquette county:<br>Republic township<br>(July 1–July 26.) | 1 | 1 | | | |
| 5 | Bay county:<br>Bay City<br>(Mar. —.) | 13 | 13 | Saginaw county:<br>Chesaning village<br>(May–June.) | --- | --- | | | |
| | | | | Sanilac county:<br>Speaker township<br>(Sept. 5–Nov. 6.) | 1 | 0 | | | |
| 6 | Berrien county:<br>Hager township<br>(July 14–Oct. 14.) | 10 | 2 | Berrien county:<br>Benton Harbor city<br>(Sept. — Apr. 1, 1894.) | 6 | 0 | Berrien county:<br>Niles city<br>(April 6 —.) | 3 | 1 |
| | | | | | | | Pipestone township<br>Jan. 19–Feb. 10.) | 1 | 0 |
| | | | | | | | Van Buren county:<br>Bangor village<br>(Sept. 18–Oct. 30.) | 1 | 0 |
| 7 | Calhoun county:<br>Battle Creek city<br>(July 28–Nov. 14.) | 19 | 10 | Lapeer county:<br>Columbiaville village<br>(Sept. 24–Nov. 12.) | 1 | 0 | | | |
| 8 | Cass county:<br>Howard township | * | ---- | Cass county:<br>Cassopolis village<br>(Dec. 8–Dec. 21.) | 1 | 1 | | | |
| 9 | Dickinson county:<br>Iron Mountain city<br>(July 2–Nov. 12 ) | 49 | 8 | Menominee county:<br>Mellen township<br>(Nov. 1 —.) | 1 | 0 | | | |
| 10 | Eaton county:<br>Windsor township | * | ---- | Calhoun county:<br>Albion city<br>(May 5–Dec. 1.) | 5 | 1 | | | |
| 11 | Emmet county:<br>Harbor Springs village<br>(Sept. 3–Oct. 28.) | 9 | 2 | Emmet county:<br>Bear Creek township | 1 | 1 | | | |
| | | | | Leelanaw county:<br>Sutton's Bay twp.<br>(Sept. 17–Oct.) | 1 | 0 | | | |

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†The numbers in this column refer to similar numbers before quotations in the text following this table.

* Typhoid fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 7.—CONTINUED.—*Movement of Contagium or Infection.*

| Number.† | First Localities from which Typhoid Fever spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 12 | Gogebic county: Ironwood city (Jan. 7-Dec. 31.) | 824 | 38 | Gogebic county: Bessemer city (June 3-Nov. 1.) | 43 | 5 | | | |
| | | | | Marquette county: Marquette city (Aug. 10-Oct. 11.) | 16 | 3 | | | |
| | | | | Republic township (June 24-July 9.) | 1 | 1 | | | |
| | | | | Van Buren county: Decatur township (Aug. 5.) | 1 | 0 | | | |
| 13 | Houghton county: Duncan township | * | --- | Marquette county: Republic township (Oct. 4-Nov. 10.) | 1 | 0 | | | |
| 14 | Houghton county: Calumet township (Jan.-Jan. 1894.) | 64 | 4 | Keweenaw county: Allouez township (Nov. 21-Dec. 18.) | 1 | 0 | | | |
| 15 | Huron county: Mead township (Mar.-May 19.) | 6 | 0 | Huron county: Hume township (Mar. 4.) | 3 | 0 | | | |
| | | | | Lake township (Mar. 15.) | 1 | 0 | | | |
| 16 | Huron county: Port Austin village | 3 | 1 | Huron county: Port Austin township (Oct. 1-Nov. 18.) | 3 | 0 | | | |
| 17 | Huron county: Sand Beech village (Aug. ——.) | 5 | 1 | Huron county: Port Hope village (Aug. 13-Sept. 29.) | 2 | 0 | | | |
| | | | | St. Clair county: Lynn township | 12 | 0 | | | |
| 18 | Kalamazoo county: Kalamazoo city (Jan. 7-Dec. 30.) | 61 | 6 | Allegan county: Lee township (Aug. 15-Oct 6.) | 6 | 1 | | | |
| 19 | Kent county: Grand Rapids city (Jan. 8-Dec. 31.) | 356 | 70 | Ionia county: Saranac village (Jan. 25-April 20.) | 1 | 0 | | | |
| | | | | Kent county: Ada township (Jan. 25-Mar. 1.) | 1 | 0 | | | |
| | | | | Cascade township | 3 | 0 | | | |
| | | | | Cedar Springs village (Sept. 15-Nov.) | 1 | 0 | | | |
| | | | | Gaines township (Feb. 11-Apr. 18.) | 2 | 0 | | | |
| | | | | Gaines township (Sept. 18-Oct. 2.) | 1 | 0 | | | |
| | | | | Nelson township (Sept. 22-Nov. 15.) | 1 | 0 | | | |
| | | | | Livingston county: Hamburg township (Oct. 7.-Nov. 18.) | 1 | 0 | | | |
| | | | | Muskegon county: Moreland township (June 9-July 2.) | 1 | 1 | | | |

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† The numbers in this column refer to similar numbers before quotations in the text following this table.

* Typhoid fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 7.—CONTINUED.—*Movement of Contagium or Infection.*

| Number.† | First Localities from which Typhoid Fever spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 19 | Kent county: Grand Rapids city (Jan. 3-Dec. 31.) | 356 | 70 | Ottawa county: Jamestown township (Jan.-Dec. 10.)<br>Wright township (Oct. 5-Nov. 22.) | 6<br>3 | 1<br>0 | | | |
| 20 | Kent county: Lowell village | * | ---- | Missaukee county: Lake City village (Sept. ——.) | 1 | 0 | | | |
| 21 | Leelanaw county: Empire township | 2 | 2 | Leelanaw county: Glen Arbor tw'p (June 1.-July 25.) | 1 | 0 | | | |
| 22 | Lenawee county: Medina township | * | ---- | Hillsdale county: Wright township (Oct. 2-Oct. 18.) | 1 | 0 | | | |
| 23 | Livingston county: Fowlerville village | * | ---- | Genesee county: Mundy township (Aug. 6.) | 1 | 0 | | | |
| 24 | Manistee county: Manistee city | 2 | 0 | Mecosta county: Big Rapids city | 1 | 0 | Benzie county: Inland township (Oct. 17-Nov. 8.)<br>Mecosta county: Millbrook township (June 11-Dec. 30.) | 1<br>2 | 1<br>0 |
| 25 | Mecosta county | ---- | ---- | Ionia county: Lake Odessa village | 2 | 2 | | | |
| 26 | Menominee county: Menominee city (July 11-Feb. 4, 1894.) | 36 | 6 | Houghton county: Chassell township (Dec. 18.) | 1 | 0 | | | |
| 27 | Montcalm county: Stanton city (July 28.) | 7 | 2 | Montcalm county: Sidney township (Nov. 1-Jan. 1.) | 1 | 0 | | | |
| 28 | Newaygo county: Newaygo village (Sept. 10-Jan. 17, '94.) | 4 | 1 | Newaygo county: Croton village (Sept.-Oct.) | 1 | 1 | | | |
| 29 | Sanilac county | ---- | ---- | St. Clair county: Kenockee township (Nov. 5-Mar. 4, 1894.) | 4 | 0 | | | |
| 30 | St. Clair county: Port Huron city (Aug.-Dec.) | 22 | 2 | Antrim county: Banks township (Oct. 10-Jan. 1, 1894)<br>Sanilac county: Elk township<br>St. Clair county: Kimball township (Sept. 22-Oct.)<br>Tuscola county: Novesta township (Dec. 1-Jan., 1894.) | 2<br>1<br>1<br>1 | 1<br>0<br>1<br>0 | | | |
| 31 | St. Clair county: St. Clair township (June-Oct.) | 3 | 2 | Lapeer county: Columbiaville village (Aug.-Sept.) | 1 | 0 | | | |

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† The numbers in this column refer to similar numbers before quotations in the text following this table.

* Typhoid fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 7.—CONTINUED.—*Movement of Contagium or Infection.*

| Number.† | First Localities from which Typhoid Fever spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 32 | St. Joseph county:<br>Three Rivers village | 3 | 0 | Tuscola county:<br>Koylton township<br>(Aug. 19–Nov. 28.) | 5 | 0 | | | |
| 83 | Tuscola county:<br>Caro village | * | ---- | Tuscola county:<br>Fair Grove township<br>(Oct. 12–Nov. 28.) | 1 | 0 | | | |
| 34 | Tuscola county:<br>Gagetown village | * | ---- | Oakland county:<br>Addison township<br>(Jan.-Feb ) | 4 | 0 | | | |
| 35 | Van Buren county:<br>Paw Paw village<br>(June ——.) | 3 | 0 | Kalamazoo county:<br>Pavilion township<br>(Sept. 22.) | 1 | 0 | | | |
| 36 | Van Buren county:<br>South Haven village. | 2 | 0 | Van Buren county:<br>Covert township<br>(Oct. 8.) | 2 | 1 | | | |
| 37 | Wayne county:<br>Detroit city<br>(Jan.-Dec.) | 83 | 83 | Gladwin county:<br>Bentley township<br>(Sept. 9–Nov. 15.) | 8 | 0 | | | |
| 38 | Wayne county:<br>Plymouth village | 1 | 0 | Monroe county:<br>Ash township<br>(Dec. 7.) | 1 | 0 | | | |
| 39 | Wayne county:<br>Wyandotte city | 3 | 0 | Monroe county:<br>Ash township<br>(July-Oct.) | 5 | 0 | | | |
| 40 | Wexford county:<br>Harriette village | 1 | 0 | Gratiot county:<br>New Haven township.<br>(July 10–Aug. 23.) | 1 | 0 | | | |
| 41 | Wexford county:<br>Cadillac city | 4 | 3 | Wexford county:<br>Cedar Creek township | 1 | 1 | | | |

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† The numbers in this column refer to similar numbers before quotations in the text following this table.

* Typhoid fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

TABLE 7.—Continued.—*Movement of Contagium or Infection* Into Michigan *from outside the State.*

| Number.† | First Localities from which Typhoid Fever spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 42 | Chicago | ---- | ---- | Cass county:<br>Cassopolis village<br>(April 5-May 7.) | 1 | 0 | | | |
| | | | | Huron county:<br>Bingham township<br>(Oct. 15-Nov. 25.) | 2 | 0 | | | |
| | | | | Lenawee county:<br>Palmyra township<br>(April 5.) | 4 | 1 | | | |
| | | | | [4] Livingston county:<br>Howell village<br>(Oct. 18.) | 1 | 0 | | | |
| | | | | Muskegon county:<br>Whitehall village<br>(Sept. 9-Nov. 12.) | 1 | 0 | | | |
| | | | | Oakland county:<br>Farmington twp.<br>(Nov. 24-Dec. 23 ) | 1 | 0 | | | |
| | | | | Oakland county:<br>Independence twp.<br>(Sept.-Oct.) | 1 | 0 | Oakland county:<br>Waterford township<br>(Sept.-Oct.) | 1 | 0 |
| | | | | Oceana county:<br>Pentwater village<br>(Sept. ——.) | 1 | 0 | | | |
| | | | | [9] Ontonagon county:<br>Rockland township<br>(Sept.-Nov. 18.) | 1 | 0 | | | |
| | | | | St. Joseph county:<br>Sturgis village<br>(Oct. 25-Dec. 10.) | 1 | 1 | | | |
| 43 | Dakota | ---- | ---- | Shiawassee county:<br>Perry township<br>(Oct. 8-Dec. 14.) | 1 | 0 | | | |
| 44 | Denmark | ---- | ---- | Menominee county:<br>Menominee city<br>(July 11-Feb. 4, 1894.) | 36 | 6 | | | |
| 45 | Illinois:<br>Evanston | ---- | ---- | Menominee county:<br>Menominee city | 2 | 1 | | | |
| 46 | Indiana:<br>Garrett | ---- | ---- | Branch county:<br>Noble township | 5 | 0 | | | |
| 47 | Iowa | ---- | ---- | Barry county:<br>Thornapple twp.<br>(Sept. 14-Nov.) | 4 | 1 | | | |
| 48 | Kentucky | ---- | ---- | Berrien county:<br>Galien village<br>(Nov. 18.) | 1 | 0 | | | |
| 49 | Minnesota:<br>Duluth | ---- | -- | Midland county:<br>Hope township<br>(Aug. ——.) | 1 | 0 | Midland county:<br>Edenville township<br>(Sept. 8-Dec. 14.) | 4 | 0 |
| | | | | Wexford county:<br>Colfax township | 1 | 0 | | | |
| 50 | New Mexico | ---- | ---- | Monroe county:<br>Dundee township<br>(July 12-Sept. 28.) | 3 | 1 | | | |
| 51 | Tennessee | - -- | -- | Mecosta county:<br>Grant township<br>(July-Aug.) | 1 | 0 | Mecosta county:<br>Chippewa township<br>(Aug. 18-Oct. 21.) | 2 | 0 |

† The numbers in this column refer to similar numbers before quotations in the text following this table.

TABLE 7.—CONTINUED.—*Movement of Contagium or Infection* Into Michigan *from outside the State.*

| Number.† | First Localities from which Typhoid Fever spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 52 | Wisconsin:<br>Milwaukee | ---- | ---- | Benzie county:<br>Frankfort village<br>(May 27-June 20.) | 1 | 0 | | | |
| | | | | Muskegon county:<br>Muskegon city<br>(May 1-Jan. 6, 1894.) | 6 | 1 | | | |
| 53 | Wisconsin:<br>Hurley | ---- | ---- | Gogebic county:<br>Bessemer township<br>(June 21-Sept. 15.) | 2 | 0 | | | |

†The numbers in this column refer to similar numbers before quotations in the text following this table.

TABLE 7.—CONTINUED.—**Probable** *Movement of Contagium or Infection.*

| First Localities from which Typhoid Fever probably spread. | | | Second Localities probably Infected from First. | | | Third Localities probably Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|
| Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| Ingham county:<br>Mason city | * | ---- | Ingham county:<br>LeRoy township<br>(Oct 21-Dec. 25.) | 1 | 0 | | | |
| Ingham county:<br>Onondaga township | * | --- | Ingham county:<br>Aurelius township<br>(Oct. 2-Nov. 9.) | 1 | 0 | | | |
| Kent county:<br>Grand Rapids city<br>(Jan. 3-Dec. 31.) | 356 | 70 | St. Clair county:<br>Berlin township<br>Oct. 1-Oct. 28.) | 2 | 1 | | | |
| | | | Kent county:<br>Paris township<br>(Sept. 15-Oct. 15.) | 2 | 1 | | | |

TABLE 7.—CONCLUDED.—**Probable** *Movement of Contagium or Infection* **Into Michigan** *from outside the State.*

| First Localities from which Typhoid Fever probably spread. | | | Second Localities probably Infected from First. | | | Third Localities probably Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|
| Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| Chicago | ---- | ---- | Shiawassee county:<br>Woodhull township<br>(Nov. 12-Dec. 31.) | 1 | 0 | | | |
| | | | St. Joseph county:<br>Constantine village<br>(Aug. 20-Sept. 17.) | 1 | 0 | | | |
| | | | Van Buren county:<br>Pine Grove township<br>July 26-Aug. 16.) | 1 | 1 | | | |

* Typhoid fever was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there; showing that the disease, if present, was neglected; probably it was not reported to the health officer as the law requires.

### *Typhoid Fever Traced to Outside Jurisdictions.*

The following are extracts from some representative reports of health officers, who were able to trace the source of contagium of typhoid fever, in their jurisdictions, to outside jurisdictions,—with the name of the health officer and the place of his jurisdiction subjoined. The numbers placed before quotations refer to similar numbers in first column of Table 7.

1. "From an infected house in the village of Otsego."—*Oliver B. Brockway, H. O., Alamo Tp., Kalamazoo Co.*

3. "The case came home from the vicinity of Central Lake, Antrim Co."—*S. A. Johnson, M. D., Kalkaska Vil., Kalkaska Co.*

5. "From Bay City, after having been sick nearly two weeks."—*D. W. Mudge, M. D., Chesaning Tp., Saginaw Co.*

6. "It was contracted at Benton Harbor while at school."—*H. G. Clippenger, M. D., Pipestone Tp., Berrien Co.*

6. "Contracted by a laborer in an adjoining township of Hagar and brought in."—*Wakeman Ryno, M. D., Benton Harbor City, Berrien Co.*

6. "Exposed in Benton Harbor."—*Jno. D. Greenamyer, M. D., Niles City. Berrien Co.*

11. "Patient from Harbor Springs, Mich., was sick for about ten days before coming to Bear Creek Tp."—*A. G. Oven, M. D., Bear Creek. Tp., Emmet Co.*

11. "Patient came from Harbor Springs, where typhoid fever existed at the time."—*W. M. Payne, M. D., Sutton's Bay Tp., Leelanaw Co.*

12. "Child of 10 years visited friends here from Ironwood where typhoid is epidemic."—*F. Harkin, M. D., Health Officer, Marquette.*

14. "Was a resident of Calumet Tp., when taken sick."—*James Haskins, M. D., Allouez Tp., Keweenaw Co.*

18. "Brought from Kalamazoo."—*A. D. Parker, Lee Tp., Allegan Co.*

19. "Patient contracted disease in Grand Rapids."—*J. K. Hanna, M. D., Gaines Tp., Kent Co.*

19. "Patient was taken sick in Grand Rapids and came home sick."—*John B. Dewar, M. D., Cedar Springs village, Kent Co.*

19. "Patient had been working at Grand Rapids and came home sick."—*John N. Swartz, M. D., Hamburg Tp., Livingston Co.*

27. "She caught it at Stanton."—*H. Fisk, H. O., Sidney Tp., Montcalm Co.*

30. "Brought from Port Huron, Mich., or was taken from an infected bed on his way here."—*Dempster H. Stebbins, Banks Tp., Antrim Co.*

34. "Patient came from Caro to his home in Fair Grove on Oct. 20, and was sick at the village of Fair Grove."—*S. D. Smith, M. D., Health Officer, Fair Grove, Tuscola Co.*

36. "Came from South Haven."—*O. M. Vaughan, M. D., Covert Tp., Van Buren Co.*

37. "They came from Detroit here with it."—*J. J. Edwards, Bentley Tp., Gladwin Co.*

40. "Patient came from Harriette, Wexford Co., Mich."—*Godfrey Crouse, New Haven Tp., Gratiot Co.*

41. "Infected at Cadillac."—*V. F. Huntley, M. D., Cedar Creek Tp., Wexford Co.*

42. "This man was in Chicago and after the first few days there, he felt sick, but did not come home till obliged to and disease developed."—*Alex. O'Neil, M. D., Howell village, Livingston Co.*

42. "Patient came here sick from Chicago, drinking impure water in Chicago."—*W. C. Gates, M. D., Rockland Tp., Ontonagon Co.*

An outbreak of typhoid fever in the township of Noble, Branch Co., which occurred in September, 1893, was reported by W. H. Grove, Health Officer of the township, who stated as follows:—

"Regarding those cases of typhoid fever, I will say that they occurred in two families; two of the cases being in one family, and the remaining five in another. The first case in the former family was a young man, aged about 30 years. I do not know the cause of his sickness. His mother cared for him, and had the disease. I suppose she 'took' the disease from him. Her death is mentioned in the report.

46. "As to the latter family, I think the mother took the disease while caring for her daughter, who was sick with typhoid fever at Garrett, Ind. She came home, had the disease, and the other four members of family also had it."

Grand Rapids and Chicago were each reported as having been the source of 10 cases of typhoid fever in various parts of Michigan; the following states and countries were also reported as having been the source of Michigan cases of typhoid fever: Dakota, Denmark, Illinois, Indiana, Iowa, Kentucky, Minnesota, New Mexico, Tennessee and Wisconsin.

Relative to an outbreak of typhoid fever in Unadilla Tp., Livingston Co., continuing from Sept. 8, to Nov. 25, 1893, and resulting in 5 cases and 2 deaths, the health officer, Samuel Du Bois, M. D., reported as follows:—

"From caring for and nursing case first. There was no spread of the disease other than *the neighbors who were assisting to care for the first case.*"

### *Outbreaks Attributed to Infected, Contaminated or Impure Water.*

The following are extracts from reports by a few of the health officials, who attributed the cause of 1,401 cases of typhoid fever, in their jurisdictions, to infected, contaminated, impure, or surface water,—with the name of the health officer (or other health official) and the name of the jurisdiction subjoined:—

"The probable source is drinking water from an infected creek. The patients are all in one family." *A. W. Foy, M. D., Central Creek, Antrim Co.*

"Impurity of the water and general bad condition of the house." *Henry A. Shurtleff, M. D., Lee Tp., Calhoun Co.*

"Water from shallow wells." *H. B. Garner, M. D., Harbor Springs Vil., Emmet Co.*

"Infection supposed to come from a well in a barnyard 20 feet lower than school privies, 15 rods away; also cemetery other side of road but descent of yards towards well. Well 12 rods from cemetery." *Charles W. Marvin, M. D., Newark Tp., Gratiot Co.*

"Was supposed to be from drinking water from a well in which a hog was drowned." *A. M. Ferguson, Health Officer, Woodbridge Tp., Hillsdale Co.*

"Drinking well or swamp water." *E. H. Pomeroy, M. D., Calumet Tp., Houghton Co.*

"A family drank water from a suspected well and all fell sick." *J. M. B. Picketts, M. D., Lake Linden, Houghton Co.*

"From a poor well placed so as to receive drainage from barns, closets and waste water." *F. E. Fletcher, M. D., Health Officer, Torch Lake Tp., Houghton Co.*

"From drinking water from contaminated wells." *Otto Frenzel, M. D., Winsor Tp., Huron Co.*

"There is a dwelling here to which no less than ten or twelve cases of typhoid fever have been directly traced in the last four years. We think that the source of the disease must be in the drinking water that the family uses." *G. A. Rowe, M. D., Stockbridge, Ingham Co.*

"From two wells of bad water." *Chas. H. McKain, M. D., Vicksburg village, Kalamazoo Co.*

"From an old well." *J. A. Leighton, M. D., McMillan Tp., Luce Co.*

"Water which contained organic matter." *H. M. Haskell, M. D., Richmond Tp., Marquette Co.*

"Caused from our hydrant water." *J. W. Decker, M. D., Lake City village, Missaukee Co.*

"Due to drinking of water taken from dirty spring." *C. W. Weaver, M. D., Tallmadge Tp, Ottawa Co.*

"Swamp water." *James Currey, H. O., Lamotte Tp., Sanilac Co.*

"The young man had been working in a mill in Mecosta county, where they had dirty, pool, surface swamp water, was taken with chills and fever and came home to Lake Odessa. Fever has taken on continued form and is running about a regular typhoid fever." *D. B. Kilpatrick, M. D., Lake Odessa, Ionia Co.*

"Stagnant water from a marsh." *H. W. Cobb, M. D., Perry Tp., Shiawassee Co.*

"Drinking river water near sewer outlet." *Wm. K. Moore, M. D., Algonac village, St. Clair Co.*

"Was a section hand on R. R., took their water for the day in a keg, and out of Lake Michigan." *N. S. Taylor, Health Officer, Geneva Tp., Van Buren Co.*

"From the use of water made impure from the drouth." *H. E. McNitt, Haring Tp., Wexford Co.*

### *Supposed Typhoid Fever at St. Clair City.*

Relative to an outbreak of typhoid fever at St. Clair city, St. Clair Co., the Detroit Tribune of Sept. 22, 1893, says:—

> "St. Clair: Some of the pipes in the city's water system have been found clogged with decaying refuse, and filth has been coming out of the house taps in large quantities. The water works engineer has been discharged. The present epidemic of typhoid and malarial fever is attributed to the foul water."

September 25, a "blue letter"* was sent from this office to Dr. W. G. Burtless, health officer of St. Clair, who replied as follows:—

> "We are having no outbreak of typhoid fever. At least there has been but one case reported to me and that was changed next day because I had a notice put up on the house. After two years of careful watching I can get no evidence of contagion. There is generally but one case in a family and those who visit the sick are no more apt to come down than those who do not. We are having a low form of fever that lasts from 14 to 28 days, not dangerous, 99 or more of each one hundred get well. We have one physician that calls it typhoid fever, but will not report it."

In his "final report" of this outbreak Dr. Burtless gives the number of cases as nine with no deaths, but in a note to the report he says:—

> "Several physicians have had many cases of fever, but all claim that they were only malarial, except Dr. Bradley who reported some as typhoid. There were probably 150 cases of malarial or typho-malarial, but no record of them has been kept."

### *Epidemic of Typhoid Fever at Ironwood.*

The following is a brief history of an outbreak of typhoid fever at Ironwood, Gogebic Co., Mich., in which, although that city had almost continuous cases of typhoid fever since January 1, 1893, the disease seems to have become epidemic in April and continued with greater or less violence until September when it seems to have been checked, although scattering cases continued through the year. The outbreak, which resulted in 824 cases and 38 deaths was investigated as to its cause, by the Secretary of this Board, and the investigation and subsequent tests at the State Laboratory of Hygiene showed conclusively a contaminated water-supply, and his prophesy as to the results of the neglected disinfection of excreta, and the consequent contamination of the wells has been remarkably fulfilled as following reports show.

April 12, 1893, a "final" report was received from Dr. J. K. Niven, the health officer of the city of Ironwood, Michigan, in which he noted the occurrence of 52 cases of typhoid fever, with 2 deaths. The outbreak was reported as having commenced Jan. 9, and ending March 10, 1893. Relative to the source of contagium, the health officer says:—"Probably from wells, which are very shallow, and contain only surface water. He also says that "typhoid fever is practically endemic here."

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*EXPLANATION OF THE TERM "BLUE LETTER:"—This is a printed letter-form, with blank spaces, for the name and address of the officer written to, and for the insertion of the name of the disease which is alleged to be present in his jurisdiction. On information being received at the office of the State Board of Health that there is a case of any one of the dangerous communicable diseases, in any township, city or village in Michigan, a "Blue Letter" is sent to the health officer of the jurisdiction in which the person sick is said to reside. In some cases this gives to the local health officer his first notice of the disease; but in any case there are sent to the health officer, for distribution among the neighbors of the persons sick, several copies of a pamphlet telling just how to restrict that disease. The "Blue Letter" urges the importance of prompt action on the part of the local health authorities, in the isolation of persons having the disease, and the subsequent thorough disinfection of premises and any article likely to be infected. It also gives a list of questions which the health officer will be required to answer in his final report of the outbreak.

May 27, 1893, a weekly report was received from the health officer, (which was our first information of the occurrence of a new outbreak), in which he reported the occurrence of fifteen cases of typhoid fever during the week ending May 20. This was the beginning of a great epidemic in that city.

June 3, in a published letter, the health officer condemned the general water supply, and strongly urged the inhabitants to "boil the water," and said:—"Of ninety-eight cases reported, all but three have used city water."

June 8, a letter was received from S. A. Souther, Superintendent of the water works of the city of Ironwood, relative to the subject, in which he complained that the city health officer attributed the presence of the disease to the city water supply. The superintendent states that:—

> "The health officer has published a statement that it comes from the water we furnish, and as we are in doubt about it we send a letter to *all* the physicians for their opinions * * * . Meanwhile people are dropping down at the rate of from five to ten per day with the fever.
>
> "As the physicians are quarreling and nothing is being done we think the State Board of Health should take the matter in hand."

June 9, Dr. Niven, the health officer, telegraphed this office,—"Nearly two hundred cases tyhus fever in Ironwood. State Board of Health must come and investigate at once." Upon being asked by telegraph whether the cases were typhus or typhoid, he answered:—"About two hundred cases well developed typhoid, not typhus, in city."

June 11, the Secretary of this Board was in Ironwood and made an investigation of the conditions of the various possible sources of infection of the outbreak, relative to which he states:—

> "The disease was so widespread and the onset so sudden that I had to look for some unusual cause of typhoid which commenced to act a few days previous to the occurrence of the first cases. Several alleged causes were urged: 1, the general water-supply, which was obtained from a small stream, the Montreal river; 2, the water from wells, to which in years past the autumnal outbreaks of typhoid have been traced; 3, the digging of filth-saturated soil for the laying of water mains and sewers; 4, the stirring up and removal, this spring, of great quantities of filth which accumulated during the winter; 5, the present filthy condition of some gutters and alleys; 6, atmospheric influences, alleged to have caused the fever in neighboring localities; 7, some influence connected with the Ironwood High School. No sudden change in any of these conditions, such as would account for the epidemic, was pointed out to me, or could, at first, be found.
>
> "I visited the pumping station of the general water-supply, and at once noticed that recently there had been a very unusual overflow of the locality. Logs had been floated all round the building, and one rested near the reservoir for receiving the filtered water, and from which the water is supplied to the two cities, Ironwood, Mich., and Hurley, Wis. I noticed that the privy for the use of the engineer and family had been floated about, and not carried far down the stream, and the excreta under it had been nearly all washed away. The water line showed that the water had been higher than the first floor of the pumping house and within a few inches of the fire in the furnaces. I learned that the reservoir had been overflowed, that the intake pipe had been so clogged as to be useless for several days; it then being impossible to filter the water, a break had been purposely made in the reservoir on the side toward the privy, which was on the down stream side but only about 35 feet distant, and the foul water of the overflow, probably contaminated with human excreta, allowed to fill the reservoir, and this was pumped into the mains to supply Ironwood and Hurley. As nearly as I could learn, this was between the 10th and 15th of May. The first person taken sick in this outbreak, was May 13. The greatest number yet officially reported were taken sick during the week ending June 10. It does not follow that all the cases were caused during the few days between May 10 and 15, because filth from the same source was still contaminating the water in the reservoir as late as the last day of my visit, June 12. [This seems almost incredible without explanation, because the break in the side of the reservoir had been filled up again; but the repairing of the break was imperfectly done and the reservoir was alternately filled and emptied by pumping the

water to the standpipe on the hill; whenever the reservoir was emptied the foul water from near where the privy had stood leaked through the imperfectly repaired wall into the reservoir thus contaminating the water which later was pumped into the reservoir and from there to the standpipe and to the consumers of water.] A sample of the *contaminating* water was sent by me to the State Laboratory of Hygiene, Ann Arbor, and was reported by the director, Prof. Vaughan, to contain pathogenic microörganisms, which caused the death of white rats into which they were injected, the rats then having inflamed intestines and enlarged spleens, as did persons whom I saw sick at Ironwood. [At Ann Arbor, June 15, I saw the intestines and spleens of the rats whose death had been caused by the germs in the water from Ironwood.]

"At my instance, the standpipe was nearly emptied when I was there. Since my return I have learned that several tons of filth was found in the standpipe, including the remains of dead fish and crabs.

"Although this outbreak seems to have been caused by the general water-supply, and the importance of disinfecting the typhoid excreta has been urged upon the inhabitants, it seems almost certain that *the wells throughout the city will be contaminated and soon become a source of danger*, especially in the autumn when the water becomes low, unless extraordinary efforts are made to prevent it."

Concerning the result of this investigation of June 11, the secretary of this Board further stated:—

"When the freshet occurred, the intake pipe clogged up, and the hole was made in the side of the receiving basin; the water went into the basin, not exactly from the river, but from the overflow water very near where the privy was. As soon as the intake pipe was again available, the hole in the side of the basin was imperfectly closed, and banked outside by earth taken from where the privy stood. When the basin was pumped full the water leaked out of the basin at the imperfectly repaired hole; when the pumps stopped pumping water in and pumped water out of the basin, the overflow water, saturated with soakings from the privy soil, leaked *into* the basin. This resulted in fouling the city water-supply intermittently."

On June 12, a committee of the City Council, accompanied by the Secretary of this Board again visited the pumping station of the general water-supply. According to the report of this investigating committee, made to the council June 12, it was found that:—

"For a long time the filter was not in use at all; that during the freshet (in May), the water from the river was allowed to run directly into the well (basin), from which the water is pumped into the city mains; that a closet vault in close proximity to said well has been overflowed, and its contents may have been circulated through the water mains; that when the intake pipe became choked, a hole had been made in the side of the well, thus allowing the water to run directly from the river; that on pumping the water out of said well we found surface water running through several parts of the wall thereof; that a large deposit of filth was found in the bottom of the stand-pipe on Norrie Hill."

Summing up, the Secretary of the Board said:—

"That the outbreak of fever in June was caused by the accidents or occurrences at the pumping station, incident to the freshet, I have no doubt. The outbreak followedthat fouling of the city water-supply at the time it should have done if it were the result of it. Whether or not the basin was properly repaired as I recommended, I do not know, but soon after I was there the fever abated. But it soon rose again, and was then attributed to the fouling of the wells, because of cases which had been scattered all over the city. However, unless the basin was cleared and repaired, and other changes made, the rise in August may have been due to causes similar to those which caused the outbreak in June."

The following extracts are taken from the health officer's letter of July 3, in reply to one from this Office:—

"I also wish to state that since you left Ironwood, I have investivated the different water-shede surrounding the city, and I have come to the conclusion that all of the eastern portion of our city is drained into the river about one-fourth of a mile above pumping station.* This implies that the only remedy will be to run a conduit about one mile further up the river.

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*[But the drainage must have been through many rods of earth, and not *very* likely to convey typhoid fever germs. H. B. B., Sec. S. B. of H.]

"In regard to what was found in stand-pipe, will say, there was a vast amount of slimy dirt, dead fish, frogs, and the remains, apparently, of a large hawk. The epidemic is abating now, the new cases being very scattering, and as a rule, in some houses where the nursing and cooking get slightly mixed. The city is agitating a new water-supply, but I fear they will require a directing hand. Can we get a visit from the State Board? If ever their presence and influence was needed, it is here, and as soon as possible. I will send you a full report of all cases, with deaths and recoveries to date, in a few days. Our physicians have been very negligent in reporting, no doubt on account of being so busy. I can speak with feeling on this, as I know the hospital staff have been worked almost day and night; but I have been promised a full report by tomorrow, and will immediately write you. I think we had three deaths last week, probably about thirty in all since the epidemic began. Please to let me know at once if we can get a delegation from State Board, and when we can expect them."

Dr. Niven, health officer of Ironwood, in a letter dated July 6, states,—"I estimate about twenty cases last week, with three deaths. Eight of the new cases I have traced to an infected well, which I have closed."

In his letter of July 11, the health officer, Dr. Niven, gives the total number of cases to that date as 399. Deaths 26. He says,—"Some new cases coming down, mostly from infected wells."

About June 15, the city of Ironwood secured the Armory as a temporary isolation hospital which proved of great assistance in checking the disease. In speaking of its work, July 16, the health officer says,—"Our temporary hospital in Armory is doing great work, and I think greatly decreases the death-rate."

Aug. 21, he writes:—

"On account of absence from city for two weeks you did not get your last week's report. The new cases developing now, are largely from contact, with some cases from infected wells. We will close our armory hospital next week. I do not expect, now, any more than we usually get at this time of the year."

The numbers of deaths and new cases reported by the health officer for each week, from the week ending May 20, to the week ending Sept. 16, inclusive, are as follows:

| | | |
|---|---|---|
| Week Ending May 20, | 0 Deaths, | 15 New Cases. |
| " " " 27, | 0 " | 30 " " |
| " " June 3, | 0 " | 30 " " |
| " " " 10, | 6 " | 125 " " |
| " " " 17, | 3 " | 30 " " |
| " " " 24, | 6 " | 50 " " |
| " " July 1, | 3 " | 20 " " |
| " " " 8, | No report. | |
| " " " 15, | 3 Deaths, | 110 " " |
| " " " 22, | 3 " | 36 " " |
| " " " 29, | 2 " | 19 " " |
| " " Aug. 5, | 2 " | 28 " " |
| " " " 12, | No report. | |
| " " " 19, | 3 Deaths, | 25 " " |
| " " " 26, | 1 " | 18 " " |
| " " Sept. 2, | 2 " | 40 " " |
| " " " 9, | 0 " | 20 " " |
| " " " 16, | 0 " | 12 " " |
| | 34 Deaths. | 608 Cases. |

## OUTBREAKS OF TYPHOID FEVER ATTRIBUTED TO CONTAMINATED WATER.

### *Outbreaks of Typhoid Fever in Bennington Tp., Shiawassee Co.*

Chas. Shickles, M. D., health officer of Bennington township, Shiawassee county, wrote to the Secretary of the State Board of Health, on Oct. 3, 1893, relative to an outbreak of typhoid fever in his jurisdiction, which probably resulted from contaminated water. He reports the following:—

"About fifteen years ago a patient died of typhoid fever in the adjoining house which has been unoccupied for some time. The privy vault of said (vacated) house is only from 20 to 30 feet from well which the patients have been using the water from. And the well is only 10 to 11 feet deep in a bed of gravel. Would it be possible or probable for the well to be contaminated from privy vault in question or from any connection from case of 15 years ago?"

In reply to the above letter the Secretary of the State Board of Health wrote to Dr. Shickles, on Oct. 5, 1893, as follows:—

"DEAR SIR:—Accept thanks for your report and letter of Oct. 3, relative to typhoid fever.

"Relative to the distance of the well from the privy vault ('20 to 30 ft.'), I should consider the well a dangerous one in that situation; and especially so if located in porous soil, as the leachings from the vault will undoubtedly contaminate the water. Water from a well so situated should not be used for drinking, or for culinary purposes without first having been boiled. It would be safer in the instance which you mention, if the well were filled up, and another one dug, at a greater distance from the privy. The distance should be *at least* one hundred feet.

"The excretions from typhoid fever patients should in no instance be thrown into a privy vault until they have been thoroughly disinfected.

"It is doubtful if the typhoid fever germ will retain its vitality for fifteen years, but the germ of it may have been propagated every in the privy vault, and so kept until now."

## *Typhoid Fever Caused by Contaminated Water in Sylvan Tp., Washtenaw Co.*

The following history of an outbreak of typhoid fever in Sylvan Tp., Washtenaw Co., resulting in ten cases with no death, is taken from the correspondence in this office. August 25, 1893, R. McColgan, M. D., wrote to the Secretary of this Board as follows:—

"I am actively engaged in practice, and often am puzzled to know when to report on cases of supposed typhoid fever. For instance, there have been several cases of typhoid in a small village. Many of these cases have run from 21 to 25 days. Temp. from 103 to 105½ degrees, all the symptoms of typhoid fever except the diarrhea, constipation instead, but laxatives act with unusual activity and stools are horribly offensive. No epistaxis except in one case. Seven cases in one family, and three others, one in each family. It can be positively proved that each of the three patients in the three other families drank water from the well at the house where the seven cases were in the one family. One of the cases, a lady aged 38, has phlegmasia dolens, at the end of the third week. Should the cases as they occur be labeled [placarded] 'typhoid fever?' If they were not, whose duty is it to see that they should have been?

"Across the street a man is taken down with pronounced symptoms of typhoid. For the first three days, temp. gradually rises to 103½ degrees in axilla. Attending physician says that the case will likely be typhoid, when he is discharged and a young physician is called, who claims it is only dust fever contracted from a threshing machine. On the evening of 7th day, temp. is 104 degrees, morning of 8th, 100 degrees. Should a sign be placed on this case? If so what sign? This man drank the water from the well where the 7 cases were, while his family did not.

"I would be pleased to receive such instructions as would cover the case.

"If such cases are not called typhoid fever, what should they be called?"

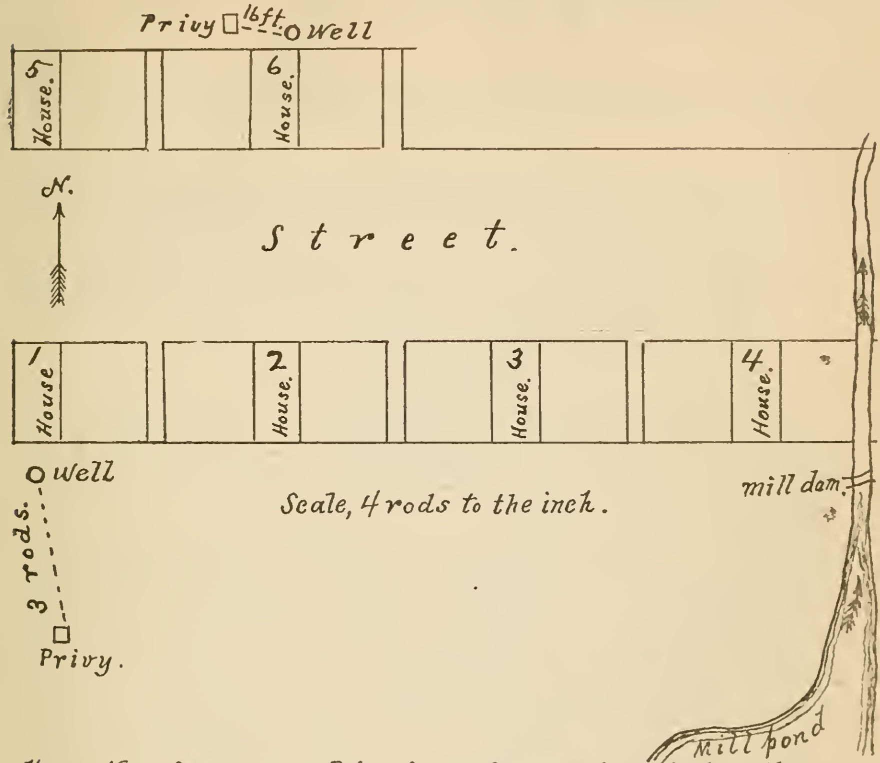
On the same date of Dr. McColgan's letter, a letter was received from E. S. Cooper, of Francisco, relative to the same subject, which read as follows:—

"I would like to call your attention to a locality that I have often thought should be visited by some member of the Board. At Sylvan Centre, in the township of Sylvan, Washtenaw Co., is an old mill, of little value, but they keep up the old dam and every summer it dries down and gets up a pretty big stench, and there have been deaths and sickness enough to condemn the old thing a hundred times.

"There are five houses placarded 'typhoid fever' there now, and it will always be so until the pond is drawn off and allowed to grass over. The mill and site are not worth five hundred dollars, and several deaths can be traced to it besides any amount of sickness."

August 26, the Secretary of this Board wrote to Mr. Cooper and sent him a copy of the law relative to the duties of the local board of health in the case of a nuisance which may be injurious to the public health, and also the manner of procedure in case the local board of health neglect or refuse to act.

Outbreak of Typhoid Fever in Sylvan Center, Washtenaw Co. Mich.



House No 1.- Seven cases. Privy in use 2 years since cleaning; soil sandy.

House No.3.- One case. Patient drank from well at House No. 1.

House No. 4.- One case. Patient drank from well at House No. 1.

House No. 5.- One case. All the family drank from well at House No. 1; one has diarrhea; another slight bilious attack. This family drank the water for a short time only.

House No. 6.- One case. Privy has not been cleaned in 5 or 6 years, and no precautions taken. This is the case that the attending physician claims is not typhoid.

[PLATE 781.]

On the same day the Secretary of this Board wrote to Dr. McColgan as follows:—

"Accept thanks for your letter of August 25, relative to typhoid fever. I am sorry that you did not state the *name* of the village in which the cases are, so that I would have been enabled to write to the health officer at once relative to the subject. The disease is doubtless typhoid fever. In any event all cases of fever of doubtful origin continuing more than seven days, should be reported to the health officer, and precautions taken as in other diseases dangerous to the public health, such as typhoid fever.

"I would be pleased if you would send me a diagram of the premises and surroundings, where the disease is, especially noting the distance of the well from the privy, and marking the location of all houses where the disease is present. Please state the length of time that the privy has been in use, and the nature of the soil whether sandy, clay, etc.

"Please give the name of the township or village where the disease is. The cases should be reported to the local health officer by the attending physician. It is the health officer's duty to placard the premises."

August 29, the Secretary of this Board received a letter from Dr. McColgan, with which was enclosed a map of the situation; the letter was as follows:—

"In answer to your favor of 26th inst. would say that the first ten cases were placarded 'typhoid fever' and that the precautions recommended were carried out. The 11th case was reported to the health officer. He went out to investigate, and after examining the patient placarded the house for 'typhoid fever.' Still the attending physician maintains that it is not a case of typhoid fever, and that he will take down the sign in three days. He says this is as the law specifies. Is it legal for the health officer to allow this? Is there a penalty attached to the unlawful removing of the sign? Must not the health officer after putting up the sign order all necessary precautions to be taken, and after the patient is well disinfect the house, even if the case does not run a full course?"

The above diagram indicates that the locality of the outbreak of typhoid fever in Sylvan Tp., Washtenaw Co., possesses all the elements for the storing and drinking of the germs of typhoid fever. The mill pond "8 or 10 rods from the street," with its stagnant, filthy water, and especially the shallow wells, sunk in the sandy soil, with long-used privies in close proximity, show the following result:—

Family No. 1, where the privy is only three rods from the shallow well, had seven cases of typhoid fever. Two persons in families Nos. 3 and 4 drank the contaminated water from well at No. 1, and were taken with the disease. Three members of family No. 5, who also used the well at No. 1, felt the effects of the contaminated water, though only one had unmistakable symptoms of typhoid fever. Case No. 6, is not traced directly to the cases in family No. 1, nor to the well at No. 1, although it may have come from that source; but at No. 6, the *privy is only 16 feet from the well!* It is a surprise that any of the residents of these households escaped from infection, although the health officer, George W. Palmer, took prompt measures to restrict its spread.

August 30, the Secretary of this Board acknowledged the receipt of Dr. McColgan's letter and diagram, and answered his questions relative to the placarding of the premises, as follows:—

"Relative to placarding the premises. The law requires the health officer 'to give public notice of infected places by placard on the premises, and otherwise if necessary.' In the absence of any regulations made and published by the local board of health, the law just quoted, has the force of such regulations, and any person who removes the placard, or disobeys the orders of the health officer, made in accordance with the law, is liable to a fine not exceeding one hundred dollars, and the costs of prosecution, and in default of payment of the fine, to imprisonment not exceeding ninety days."

### *Contaminated Water and Typhoid Fever in Otisco Tp., Ionia Co.*

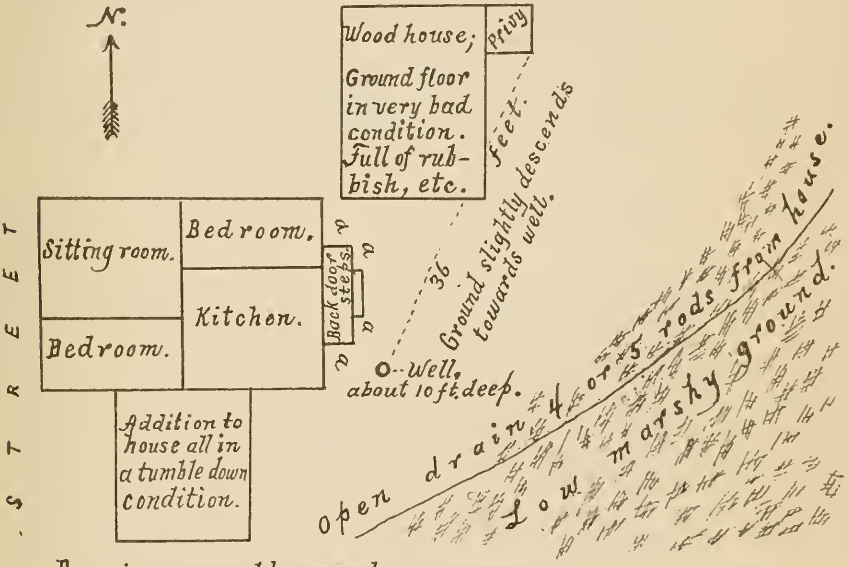
In two outbreaks of typhoid fever in Otisco Tp., Ionia Co., one in March and the other from October 25 to Dec. 25, 1893, the source of contagium is traced directly to contaminated water. Of the first outbreak, consisting of one case and one death, L. N. Tuttle, M. D., says it was caused by "drinking infected water from cemetery." The disinfection in this case was rigidly carried out and the outbreak was confined to one case.

The second outbreak, lasting from Oct. 25 to Dec. 25, 1893, resulted in 4 cases and 2 deaths. The following extracts from letters and reports by William Bell, M. D., the health officer, (who also sent the diagram which is made a part of his report of the outbreak of the disease), give details relative to this outbreak. In his final report received at this Office Dec. 31, 1893, Dr. Bell says:—

> "The introduction doubtless came from impure water—(see map)—from continued use of bad water after being continually warned——about a year ago a boy was sick (on the premises) presumably typhoid, in fact, was so diagnosed."

In a letter relative to the same outbreak, written January, 1894, Dr. Bell further says:—

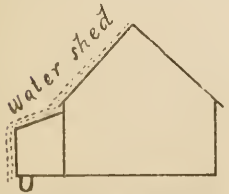
*Outbreak of Typhoid Fever in Otisco Tp., Ionia Co., Mich.*



N.
Wood house;
Privy
Ground floor in very bad condition. Full of rubbish, etc.
feet.
36
Ground slightly descends towards well.
Sitting room.
Bedroom.
Kitchen.
Bedroom.
Back door steps
a
a
a
a
Well, about 10 ft. deep.
Addition to house all in a tumble down condition.
STREET
open drain 4 or 5 rods from house.
Low marshy ground.

*Premises very old; general condition very bad.*

*a. a. a. a. Where slops have been thrown for 40 years or more.*



*North elevations of wood shed and privy.*

[PLATE 777.]

"The outbreak was clearly traceable to defective water supply, there being an old privy within 39 feet of the well, and in very bad condition, and to make matters still worse, the residence has not been occupied for several months. The cases all occurred in the same dwelling, and well only 39 feet from privy had not been in use for this period. The evidences of success attending efforts at restriction were practically nil. It was confined to one family however."

The diagram on page 281 is of a locality where typhoid fever was undoubtedly the ultimate result of the proximity of the contaminated privy to the shallow well. The diagram shows the privy, shallow vault "filled," where the excretions of the boy who was sick (on the premises) about a year ago were probably deposited; the shallow well "about ten feet deep" "in loose gravel soil," and only 36 feet from the privy; the "places where slops have been thrown for 40 years or more," and distant not to exceed from 3 to 5 feet from the well; the woodshed with its "ground floor in very bad condition" joins the privy, making a continuous water shed on one side so that in rainy or wet weather the volume of water which would naturally flow from the privy is increased by that from the whole half the overflow from the woodshed roof, making a considerably larger quantity of water to soak into the ground, contaminated by the privy soil, rendering the soaking process more sure and rapid. The natural result would be the contamination of the well, which, from the evidence received at this office, seems to have been done.

### *Outbreak of Typhoid Fever Attributed to "Swamp-Water," at Seville Tp., Gratiot Co.*

Charles McLachlin, M. D., Health Officer of Seville Tp., Gratiot Co., reports an outbreak of typhoid fever commencing August 25 and continuing until December 30, 1893, from which 17 cases and 3 deaths resulted. Relative to this outbreak Dr. McLachlin says:—

"One of the cases (of the first ones) was taken sick, in an adjoining township, from drinking water from a swamp, while working there." Speaking of some of these cases, he said: "There were ten in the family and they were all taken sick within fourteen days from the first case."

### *Contaminated Water and Typhoid Fever at Wakefield Village, Gogebic Co.*

J. H. Eddy, M. D., health officer of Wakefield village, Gogebic Co., reporting an outbreak of typhoid fever which lasted from Sept. 1 to Dec. 22, 1893, and resulted in 65 cases and 2 deaths, says that the mode of introduction into the locality was: "By privy vaults that have filtered through the soil to the water supply." And in the final report relative to the disinfection of the excreta, Dr. Eddy says:

"Nothing was done, the patients were Finlanders and I could not make them do anything in this line."

### *Outbreaks of Typhoid Fever Attributed to Defective Drainage or Sewerage, Filth or Unsanitary Conditions, Colds, Etc.*

The following are a few extracts from reports of health officials, with the names and jurisdictions subjoined, relative to the 19 cases of typhoid fever attributed to defective drainage or sewerage, the 44 cases attributed to unsanitary conditions and 12 cases attributed to taking cold, going in water, etc.

### *Outbreaks Attributed to Defective Sewerage and Drainage.*

"Living on low land."—*U. P. Fales, Leighton Tp., Allegan Co.*

"Defective drainage."—*E. H. Webster, M. D., Superior Tp., Chippewa Co.*

"Sewerage was not good."—*John J. Reycraft, M. D., Mackinaw City, Cheboygan Co.*

"Bad drainage from wet cellar."—*W. H. Erwin, M. D., Cohoctah Tp., Livingston Co.*

"Bad sewerage, well just below out-house."—*Jacob Lightfoot, H. O., Mecosta Tp., Mecosta Co.*

"Privy is four rods from well."—*Grant Terwilliger, Ferris Tp., Montcalm Co.*

"From a swamp back of Main street."—*F. Norwood Jeffrey, M. D., Morrice Vil., Shiawassee Co.*

### *Outbreaks Attributed to Filth and Unsanitary Conditions.*

"Filthy surroundings."—*E. D. Lewis, M. D., Otisville Vil., Genesee Co.*

"Bad sanitary conditions, etc."—*F. J. Taylor, M. D., Fulton Tp., Gratiot Co.*

"Impure water and filth," "Filth in and around house."—*Seeley Amsburg, Clerk, Seville Tp., Gratiot Co.*

"Decayed vegetables in the cellar."—*M. C. McDonnell, M. D., Bad Axe Vil., Huron Co.*

"Filth on the premises."—*G. D. Gardner, Springfield Tp., Kalkaska Co.*

"Fog from a large State swamp."—*Richard G. Lewis, Clerk, Excelsior Tp., Kalkaska Co.*

"From working in an old drain."—*R. M. Eccles, M. D., Blissfield village, Lenawee Co.*

"Poor water and cellar."—*Theo. Shippee, Berlin Tp., Monroe Co.*

"Claimed that she contracted the disease while visiting in Portland, Mich. The family at Portland where she was visiting removed an old pig pen from near the house, and discovered a very foul odor from the same."—*A. L. Carey, M. D., Stanton City, Montcalm Co.*

"The house in which these diseases have occurred was once an old barn, made over into a house and moved over two old privy vaults, and especially is this noticeable in the hot weather from the scent that permeates the whole house."—*Perley W. Parsall, M. D., Health Officer, City of North Muskegon.*

"Slops at lumber camp."—*A. J. Cole, H. O., Colfax Tp., Oceana Co.*

"Filth, and living in an old log house, with floor resting on the ground."—*Owen F. Teeple, Health Officer, Elmer Tp., Sanilac Co.*

"Well or damp house."—*Adrian Kelly, Dayton Tp., Tuscola Co.*

"Unsanitary surroundings."—*J. W. Collier, M. D., Plymouth, Wayne Co.*

Relative to the source of contagium in an outbreak of typhoid fever in Dayton Tp., Tuscola Co., which occurred from April to Nov., 1893, and resulted in 6 cases, the health officer, Adrian Kelly, writes as follows:—

> "It is evident the disease is contracted from the premises somewhere, either the well or the house. The privy is only about 75 feet from the well but down hill, and is one of the old style, with a sink hole in the ground, and of long standing. The house is a poor affair, with a leeky roof, the floor on the ground almost, a large family and frequent mopping keeps the floor damp and in a decaying condition all the time. There have been no disinfectants used."

### *Typhoid Fever in Farwell Village, Attributed to Filthy Surroundings.*

The following letter was received Nov. 4, 1893, from Farwell village relative to certain unsanitary conditions being the cause of typhoid fever:—

> "Will you kindly advise me at once what measures can be taken to have dirty, filthy alleys and outhouses cleaned up and put in proper condition to prevent disease arising and spreading through our village. The matter has been reported to the health officer several times but nothing has been done, although people in the vicinity of these outhouses, and stench coming from some, are coming down daily with fever. There are no less than a dozen cases now of malaria and typhoid fever; two cases having died within the past ten days. If there is any way to have things put in shape, please advise me at the earliest possible moment as it is very evident that something should be done at once."

On receipt of the foregoing letter the Secretary of the State Board of Health immediately wrote to Dr. L. L. Kelly, health officer of Farwell village, advising him of the complaint, asking for a report as to the conditions of the locality mentioned, and reminding him of the duty of health officers in relation to protection of people residing in proximity to filthy localities, and in disinfecting, isolating, etc. No reply was received. Probably no action was taken by the health officer.

### *Typhoid Fever at Custer Tp., Sanilac Co., Attributed to Unsanitary Conditions.*

Leonard Carley, health officer of Custer Tp., Sanilac Co., wrote to the Secretary of the State Board of Health on Dec. 12, 1893, relative to an outbreak of typhoid fever which resulted in 16 cases and 1 death. The cause of infection was attributed to "excessive wet in the fore part of the season and then very dry." Relative to five of the cases, which occurred in the same family, Mr. Carley says:—

> "Cases live on the Black River Flats. The season being very wet, the land being submerged with water all the fore part of the season, then very dry, the surface only three feet higher than the bed of Black river. Their well is only three feet deep, quicksand bottom. * * * The house is small, they are very scarce of clothing, not sufficient for a change; there have been no disinfectants used. The danger of infection is great to the rest of the family, they being scarce of changes and everything else. I have been furnishing some necessaries under the board of health. The merchants don't like to furnish that way, they claim they have to wait until the next meeting of the board of supervisors for their pay."

### *Outbreaks of Typhoid Fever Attributed to Exposure, Taking Cold, Overwork, etc.*

"Over heat and going in water."—*C. H. Monroe, Supervisor, Btair Tp., Gd. Traverse Co.*
"Overwork and taking cold."—*Henry Tremayne, M. D., Ionia City.*
"Exposure."—*D. B. Henly, Atkinson Tp., Iron Co.*
"Cold and exposure."—*F. G. Bullock, Elba Tp., Lapeer Co.*
"Bad water or milk."—*S. D. Yerrington, M. D., McBain, Missaukee Co.*
"Overwork."—*D. W. Mudge, M. D., Chesaning Tp., Saginaw Co.*
"Mental over exertion."—*Stephen H. Moore, Ft. Gartiot Tp., St. Clair Co.*

Samuel A. Smith, health officer of Butler township, Branch county, reported to the Secretary of the State Board of Health relative to an outbreak of typhoid fever in his jurisdiction as follows:—

> "Twin girls, ten years of age, went to a dance, March 17, danced to excess, and became very much heated, went home lightly clad, took cold and that resulted in typhoid fever."

### *Typhoid Fever in Marine City.*

In an outbreak of typhoid fever in Marine City which resulted in 24 cases with 8 deaths, a mortality of $33\frac{1}{3}$ per cent, the cause is given as atmospheric conditions caused by the removal of bodies from an old cemetery. A letter from Dr. S. M. Hadden, health officer of Marine City, stated the following:—

> "It is my opinion, as well as some other physicians, that the cases of malarial and so-called typhoid malarial and diphtheria originated from the condition of the atmosphere caused by removing the bodies from the old Catholic burial ground, situated within the precincts of the lower part of the city."

It is very yrobable that all the cases of typhoid which occurred in Marine City in 1893 were not reported to the health officer by the physicians. Dr. Blagborne, the successor of Dr. Hadden, in reporting some cases of the disease says:—

"Many of the cases of typhoid fever reported, were not reported to me, but were pronounced typhoid fever to undertakers, from whom I obtained my information.

"It has been difficult to make final report of typhoid cases as I think there has not been one week during which the disease has not been present among us."

## *Should Health Officers Continue to Hold the Office when they do not Intend to Perform the Duties?*

The pay of local health officers is often inadequate to the amount of work done, and for that reason they are sometimes loth to give up the time from their practice to attend to the public-health interests. The following letter was received by the Secretary of this Board May 17, 1893, from Wm. E. Parker, M. D., health officer of Dowagiac:—

"DEAR DOCTOR:—I will make a report of any case or cases which come under my notice in my own or other physicians' practice in my jurisdiction. My time is too much occupied to leave my practice and measure distances of neighbors' privies from infected houses or the number of cubic feet of excreta contained therein *for nothing*. As to a weekly report, will report when there is anything to report coming under my notice. Please do not ask me to neglect my business to attend to matters just for a pastime.

"I am willing to do anything reasonable but cannot take all the measures and estimates required in the blank sent to me to fill out."

The Secretary of this Board, in a letter to Dr. Parker, fully explains the necessity for the performance of his duties by the health officer, and reviews the situation as follows:—

"DEAR SIR:—Accept thanks for your letter of May 17, and for the final report of the outbreak of typhoid fever, the beginning or ending of which you 'do not know.'

"You say,—'Please do not ask me to neglect my business to attend to matters just for pastime. I am willing to do anything reasonable,' etc. This Board does not ask anything from local health officers that is not 'reasonable,' but does ask them to comply with the law which they took oath to obey when they assumed the office of health officer. One portion of the law is that 'It shall be the duty of the health physician * * * to report to the State Board of Health their proceedings, and such other facts required, on blanks, and in accordance with instructions received from said State Board. They shall also make special reports whenever required to do so by the State Board of Health.' (See section 1629, Howell's Statutes.) Section 1 of Act 187, laws of 1883, requires the health officer, with other duties, 'to disinfect rooms, clothing and premises, and all articles likely to be infected, before allowing their use by persons other than those in isolation.'

"The fact that a case or cases of typhoid fever occurred on the premises 'one year' previous to the cases referred to in your communication, would seem to indicate that the germs of the disease were continuously present on said premises, and would seem to be a good reason why you should 'immediately investigate the subject' and 'disinfect,' etc., and if possible learn the source of the disease and remove it.

"I infer from your letter that you are poorly paid, or not paid at all, for performing the duties of health officer. I think that before you neglect your duties you ought by all means to make a strenuous effort to place the facts before your local board of health. My own view is, that if one cannot afford to perform the duties of an office as the law requires, the only proper course is to resign. I sincerely hope, however, that you will place the subject carefully before your board, and that you will receive the proper compensation for the full performance of the duties required by law. If the health physician's time is so taken up by his practice, so that he cannot attend to public health duties, he should resign and make room for some one who has the time to perform the duties of the office.

"By this mail I send you a marked pamphlet, No. 120, bearing upon the subject of compensation of health officers. I think you will do well to show this to members of your board. If you wish for other copies, I can send them."

## *Disagreement of Diagnosis in Typhoid Fever at Stanton, Montcalm County.*

During the year ending December 31, 1893, an outbreak of typhoid fever occurred at Stanton, Montcalm Co., which resulted in 7 cases and 2 deaths, a mortality of 35 per cent. Portions of the correspondence given below show what a wide difference of opinion sometimes exists between physicians, and how such a difference of opinion might possibly result in detriment to the public health and neglect of the public-health laws.

Information having reached this office of the above-mentioned outbreak, a "blue letter" * was sent to Dr. A. L. Corey, Health Officer of Stanton. On September 25, 1893, the Secretary of the State Board of Health received the following letter from Dr. Corey:—

"I have again examined all of the cases of so-called typhoid fever and I say to you that we have no typhoid in this city, neither have we had any this fall."

Further information of the existence of typhoid fever in the same locality having reached this office, another "blue letter" was sent to Health Officer Corey on October 14, 1893, to which he replied as follows:—

"I saw Dr. Bachman in reference to the sickness of Chas. T. Wicks of whom your article spoke especially, and the Doctor informed me that said Wicks only had fever for 14 days nor any rise of temperature whatever, and furthermore Dr. Bliss of Saginaw was over to see him after he had been sick for a few days and the question was asked him if Wicks had typhoid and his answer was no. As I said before I have seen all the cases of fever in my jurisdiction and so far have seen no typhoid."

On October 30, a letter was received from W. P. Gamber, M. D., a physician at Stanton, who reported relative to the outbreak of typhoid fever at that place as follows:—

"Dear Sir:—I enclose a report of the cases of typhoid fever that have been in my charge for the past few months. There were three well marked cases and all had hemorrhage from the bowels between the 16th and 21st days from beginning of the fever. No. 1 bled about 1½ pts. in 24 hours. No. 2 bled about 3 pts. in 2½ hrs., and it took very active measures to save her from death at the time. No. 3 bled about 1½ pts. in 6 hours. There has been an unusual number of cases of continued fever here during the past three months. Excepting the above, there has been no tenderness over the bowels with any of its complications. They were of the remittent type and about 18 of them continued in periods varying from 10 days to 4 weeks, while about 15 of them ran from 3 to 5 days under active measures to control them. It has come to me from various sources that Dr. A. L. Corey, our present health officer, has been circulating reports in Stanton and written the same to you that there has not been a case of typhoid fever in town this fall. * * * As soon as this first case was recognized as typhoid fever, it was reported to him, but practically so far as I know he did nothing until these other two cases had hemorrhage. * * * Dr. L. S. Crotser of Edmore saw case 1 with me, and pronounced it typhoid fever. Dr. Jas. H. Sanderson of Edmore saw case 2 with me, and pronounced it typhoid fever. Dr. Corey saw case 2 with me and did not deny to me the fact that it was typhoid fever."

On November 6, 1893, Dr. Gamber again wrote to the Secretary of this Board relative to two other cases in this outbreak. Portions of the letter are as follows:—

"I was called last night to the family of ——. I found that —— had been sick about 21 days, and as yet had not had any medical aid. There was a hemorrhagic condition of the whole system, free hemorrhage from the nose and bowels, and was almost in a moribund condition.

"Their daughter, aged 13 years, was apparently sick with the same fever since the Saturday preceding. There seemed no question in my mind about its being typhoid fever. Last Wednesday Dr. Black of Greenville and Dr. Sanderson of Edmore were here with me * * . I had them see the patient, and they with me, pronounced it typhoid fever. But to be further prepared for the unpleasant talk of our health officer, I made some bacteriological investigation in these two cases, also in one other case, that of —— whom I was called to see a few days ago, and, with the oil-immersion objective giving 1,500 diameters, I found bacilli of typhoid fever in all three of them, in discharges from the bowels. In the case of —— they were *very* numerous, in fact so much so that they have overpowered her system, and she died today. I was called to this same family of —— about two months ago to see ——'s son who was sick with a continued fever which ran 28 days. There was but one marked typhoid-fever symptom, and that was the condition of the tongue. There was no delirium or tenderness of bowels and on account of the disturbing element from the health officer I did not wish to make any more clashing than I was obliged to do, so consequently reported those as typhoid-fever wherein the symptoms were such that he could not question them; but at the same time precautionary measures were taken the same as though it had been a case of typhoid fever. I have not the least doubt but that a bacteriological investigation would have proved it to be a case of typhoid fever also."

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* A description of this letter is given on page 274.

On November 9, 1893, Dr. Gamber again wrote to the Secretary of the State Board of Health, enclosing a statement from J. H. Sanderson, M. D., of Edmore, Mich., and one from Duncan K. Black, M. D., of Greenville, Mich., both of whom stated that they had called with Dr. Gamber to see two of the cases before mentioned and each of them unhesitatingly pronounced the cases typhoid fever. The copy of the statements of Drs. Sanderson and Black are:—

"*Edmore, Mich., Nov. 8, 1893.*

"On Nov. 1st, I visited Mrs. —— ——— and daughter in consultation with Dr. W. P. Gamber of Stanton. After careful inquiry and examination I unhesitatingly diagnosed both cases as typhoid fever, which diagnosis has since been confirmed by the presence of the typhoid bacillus in the discharges.

"J. H. SANDERSON, M. D."

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"*Greenville, Mich., Nov. 8, 1893.*

"On Nov. 1st, I visited Mrs. —— ——— and daughter in consultation with Dr. W. P. Gamber of Stanton. After careful inquiry and examination, I unhesitatingly diagnosed both cases as typhoid fever, which diagnosis has since been confirmed by the presence of the typhoid bacillus in the discharges.

"DUNCAN K. BLACK, M. D."

The Secretary of this Board then wrote to Dr. Corey, the health officer of Stanton (Nov. 2, 1893), informing him of the reports received from Dr. Gamber, calling his attention to the law relative to the duty of health officers in reporting dangerous communicable diseases, also to the resolution of the State Board of Health in relation to the acceptance by the health officer of the diagnosis of a reliable physician, etc. The Secretary of this Board also wrote Dr. Gamber, as follows:—

"DEAR DOCTOR:—Your letter of Nov. 9, together with affidavits of Drs. Black and Sanderson is received, for which please accept thanks.

"In reply to your request for me to come to Stanton and investigate this alleged neglect on the part of the health officer of Stanton,—on account of the press of work in the office I don't see how I could possibly come to Stanton. I hope you will be able to settle the misunderstanding between yourselves; but if that is impossible, and the health officer still refuses to comply with the State law, I would recommend that the subject be placed before the Prosecuting Attorney of your county.

" * * * . The law is plain and adequate, Act 137, Laws of 1883, provided that 'whenever the health officer of any township, city or village, shall receive reliable notice, or shall otherwise have good reason to believe that there is within the township, city or village of which he is the health officer, a case of small-pox, diphtheria, scarlet fever, or other communicable disease dangerous to the public health' the health officer shall 'immediately investigate,' 'order the prompt and thorough isolation of those sick or infected with such disease,' etc. This State Board of Health has declared that typhoid fever is a 'disease dangerous to the public health' and the precautions should be taken as in other cases of dangerous disease. * * *

"In every case reported by an attending physician as a dangerous communicable disease it will be safest for the health officer to act on the supposition that such a case is a dangerous disease. If the health officer discredits the report and fails to do what the law provides, it may be very difficult to prove himself guiltless. State Law, Act 137, Laws of 1883, provides for the punishment of the health officer if he does not immediately 'investigate' whenever he has good reason to believe that there is a case of dangerous communicable disease, even though not technically reported to him; and when reported, reliably, his duty is plain."

It was to avoid any such evil results from disagreement of diagnosis such as above reported that the following resolution was adopted at a meeting of the State Board of Health, July 10, 1888, "That when a case of a dangerous communicable disease is reported by a reliable physician, the health officer should act upon the diagnosis of such physician without question."

### CASES OF TYPHOID FEVER RESULTING FROM A PRECEDING CASE.

In an outbreak of typhoid fever in Lynn Tp., St. Clair Co., which resulted in 12 cases but no deaths, J. C. F. Dorman, township clerk, reported to the Secretary of this Board, relative to the source of contagium, that it was "From Sand Beach, Huron Co.," and a letter from Fred Leach, school director, would seem to indicate that the 12 cases came almost directly from a former case, which came from another locality. The letter is as follows:—

> "This disease was brought to this locality (S. Lynn), early last spring, by a young woman of Sand Beach, who came from there on a visit, came down with the fever shortly after arriving here and had the fever 28 days. She was treated by a skillful physician and recovered and returned to her home in Sand Beach, Huron Co. She visited at the home of her parents while here. Her father and mother and eight brothers and sisters had the disease after she left. The family had the disease all summer, yet they all recovered.
>
> "Now it has broken out in two other families.
>
> "I see by the report of the State Board of Health for the year ending June 30, 1890, that typhoid fever was epidemic in Sand Beach in 1889, and that is the place from which the disease was brought here, and we are made to suffer from the negligence of health officials of that village even at this late date.
>
> "I am director of my school district and feel interested and duty bound to do what I can to keep it out of the school and keep the school running."

While it is true that typhoid fever was epidemic in Sand Beach in 1889, this outbreak of typhoid fever in Lynn Tp., was not certainly traced to that epidemic. It is more likely it is to be attributed to the outbreak of typhoid fever in Sand Beach in 1892, which resulted in 10 cases and 1 death, and was reported as having ended Nov. 15, 1892. The source of this outbreak is reported as unknown, and the isolation and disinfection is not mentioned. It is impossible to state definitely whether this outbreak in 1892 is traceable to the one which occurred the previous year and which was reported as having been "Brought from Detroit" nor whether the outbreak at the same place in 1893 is traceable to the one in 1892, however it is possible that the original case came from Detroit in 1891, and that isolation and disinfection being neglected, the disease has broken out again in 1892 and 1893.

Taking the facts, however, this is not only an instance that cases of typhoid fever are not infrequently traceable to other cases of typhoid fever, but a demonstration of the truth of repeated warning by the State Board of Health; that where in cases of typhoid fever, isolation and *disinfection* are neglected (the conditions being favorable) other cases of this disease are liable to appear, traceable, either directly or indirectly, to the previous case of the same disease.

### RELATIVE TO HOW REPORTS SHOULD BE MADE.

The following is a letter from Dr. Edward B. Patterson, health officer of Michigamme, who says:—

"I keep a detailed list of all these cases for myself and should be glad to transmit the same to you but I cannot make them on your blanks and have things balance. Suppose, for example, I have sent in my weekly reports with deaths, recoveries, moved in and moved out, etc., for three weeks. I am then called, as I was only a short time ago, to see a family of Finns, with five individuals, in the 3rd week of typhoid, and I am the first physician who has seen them. If I put down the date of their being taken sick from what they tell me, as I always do, then my reports are 'smashed.' If I report them as being taken sick on the date of my first visit then I will have 5 phenomenal cures to report in from 1 to 2 weeks."

In reply to the above quoted letter the Secretary of the State Board of Health wrote to Dr. Patterson, Dec. 28, 1893, as follows:—

"I do not see that even under such circumstances as you mention, you would be unable to make a 'final' on blank 'O' (for typhoid fever), which would be of great value to this office.

"Relative to making weekly reports on blank 'M,' under the circumstances to which you refer (viz., the discovery of cases which existed prior to the making of a weekly report and which were not included in the report because not then known) you should not on any account fail to make the next report. Each weekly report, if properly made, is *complete within itself* and will balance. The question in the head of the last column in the blank 'M,' 'How many sick at the close of this week,' does not necessarily determine the number to be placed in the first column,—('How many sick at the close of last week'), in the report of the next succeeding week, although *it would do so* if the law (sections 1675 and 1676, Howell's Statutes), was promptly complied with. In the instance which you mention where some were sick and not reported to you, or not discovered till the week following, the number so reported or discovered later, should be added to those reported sick at the close of the previous week and entered in the first blank column under 'How many sick at the close of last week,' and a few words on foot-note or on the side of the blank should explain *why* they were not reported the previous week."

## *Liability for care of an Indigent Person sick with a Disease Dangerous to the Public Health.*

Numerous inquiries are received at the office of the State Board of Health as to the liability of counties or localities to pay the expenses of indigent persons, sick with a dangerous communicable disease.

The legislature and the courts seem to have considered that there should be no uncertainty about the payment of those who act for the protection of the public from a dangerous disease.

A letter from F. W. Sellars, M. D., health officer of Meade Tp., Huron Co.; was received at the office of the State Board of Health, Feb. 2, 1893, in which the following inquiry was made:—

"I was obliged to hire a nurse and physician for an indigent typhoid fever patient. The county as a whole pays for taking care of the poor, and the poor commissioner refuses to pay this bill, saying it must come before the board of Supervisors, who do not meet until June. In the meantime the family who boarded and took care of the patient (a stranger to them) threaten to sue me for their pay, what had I better do in this matter?"

In reply the Secretary of the State Board of Health wrote to Dr. Sellars Feb. 6, as follows:—

"In response to your letter of Feb. 2, relative to the county commissioners refusing to pay for nurses, etc., for caring for a person ill with typhoid fever and who, it seems was unable to pay for the nurses, etc., himself. If the amount due has been fixed *by your local board of health*, the next step is for the board of supervisors to allow the bill. They have no option in the matter further than to ascertain whether the person, or those who are liable for his support are able to pay the expenses incurred under the law. If the board of supervisors do not meet until next June, I see no other course than that the person to whom the amount is due must wait until that time. If you acted within the law, I do not think that a judgment can be obtained against you for the amount. Perhaps if the subject was placed before them in its proper light, in such a way that they could understand it, they would be passified, and would be willing to wait. The law, Act 137, Laws of 1883, requires the health officer to see that no person suffers for lack of necessaries."

### MEASURES TAKEN TO RESTRICT TYPHOID FEVER—RESULTS.

Relative to an outbreak of typhoid fever in Frankfort village, Benzie Co., May 27, 1893, which resulted in one case and no deaths, the health officer, Almond A. Smith, says: "The patient is in an isolated locality with good hygienic surroundings, precautionary measures have been taken, stools and room are being disinfected and stools safely disposed of." There were no further cases of typhoid fever in this outbreak.

An outbreak of typhoid fever at Bear Creek, Emmet Co., which resulted in one case and one death, was reported by A. G. Oven, M. D., health officer as follows: "Bowel discharges, after disinfection, were buried at least 500 feet from house or well, every means to prevent infection that is suggested by the State Board used, no other cases have developed."

In Solon Tp., Kent Co., an outbreak of typhoid fever which resulted in but one case was reported by C. H. Hopkins, clerk, as follows: "Patient is isolated and surroundings are carefully disinfected, precautionary measures have been taken."

In Hadley Tp., Lapeer Co., an outbreak of typhoid fever, in Nov. 1893, resulted in one case which died. Thorough isolation and disinfection is mentioned by Peter Stewart, health officer, who says: "Clothing washed in boiling water, other articles disinfected by sulphur and then well aired, stools buried after being disinfected, and bedding burned."

In an outbreak of typhoid fever in Cumming Tp., Ogemaw Co., which continued from Sept. 1, to Oct. 18, 1893, and resulted in 2 cases but no deaths, H. M. Hammond, M. D., reported as follows: "Case is very much isolated, precautionary measures have been taken as directed in the document on the prevention of typhoid fever."

In studying the effects of efforts of health officers for the restriction and prevention of typhoid fever, and of the difficulties experienced by some of them in carryng out the methods recommended by the State Board of Health to that end, it is interesting to note the difference in the reported numbers of cases of sickness and of deaths, from this disease, in outbreaks where local health officers were enabled to enforce isolation and disinfection, and in those outbreaks in which, for any reason, those restrictive measures were neglected.

Table 9 and the diagram on pages 291–2 graphically illustrate this difference, and show that in outbreaks relative to which the reports state that isolation and disinfection were enforced, there occurred 1.60 cases and 0.24 of one death per outbreak; whereas in those outbreaks where isolation and disinfection were neglected, there were 5.10 cases of sickness and 0.50 of one death per outbreak, or more than three times as many cases and more than twice as many deaths in outbreaks in which isolation and disinfection were neglected as there were in outbreaks where those restrictive measures were enforced. It therefore seems probable that if proper restrictive measures had been adopted in all the 539 outbreaks of this disease which were reported to this office during the year, with results similar to those obtained in the above-mentioned outbreaks where isolation and disinfection were enforced (1.60 cases and 0.24 of one death per outbreak), there would have occurred only 862 cases of sickness and 139 deaths from this disease in the State during the year, instead of the 2,255 cases and 405 deaths which actually occurred in those outbreaks which were reported, and a saving to the State of 1,393 cases of sickness and 266 lives would have been effected.

TABLE 9.—*Typhoid Fever in Michigan in 1893; Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 539 outbreaks reported; (2) in the 411 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 25 outbreaks in which Disinfection was enforced and Isolation was doubtful; (4) in the 3 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 1 outbreak in which Isolation was enforced and Disinfection was neglected; (6) in the 19 outbreaks in which Disinfection was enforced and Isolation was neglected; (7) in the 47 outbreaks in which both Isolation and Disinfection were neglected; (8) in the 33 outbreaks in which both Isolation and Disinfection were enforced.*

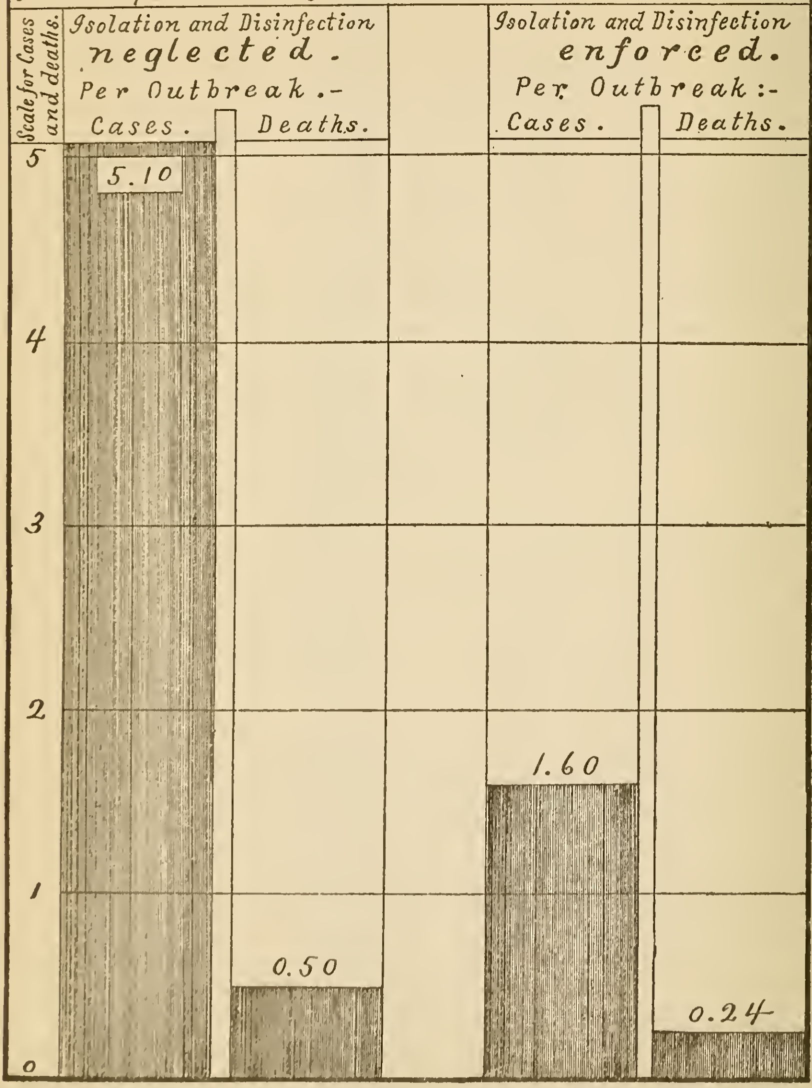
| | (1) All outbreaks. (539 outbreaks.*) | | (2) Isolation or Disinfection or both not mentioned, or statements doubtful. (411 outbreaks.) | | (3) Disinfection enforced—Isolation doubtful. (25 outbreaks.) | | (4) Isolation enforced—Disinfection doubtful. (3 outbreaks.) | | (5) Isolation enforced—Disinfection neglected. (1 outbreak.) | | (6) Disinfection enforced—Isolation neglected. (19 outbreaks.) | | (7) Isolation and Disinfection both neglected. (47 outbreaks.) | | (8) Isolation and Disinfection both enforced. (33 outbreaks.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| Totals ..... | 2,255 | 405 | 1,864 | 358 | 45 | 13 | 3 | 1 | 2 | 0 | 47 | 5 | 240 | 25 | 54 | 8 |
| Averages.. | 4.1 | 0.75 | 4.53 | 0.86 | 1.80 | 0.52 | 1.0 | 0.83 | 2.0 | 0 | 2.47 | 0.26 | 5.10 | 0.5 | 1.6 | 0.24 |

* These do not include the cases and deaths in Detroit and Grand Rapids because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease is present in some part of the city nearly all the time. The outbreak at Ironwood which became epidemic, and resulted in 824 cases and 38 deaths, is also omitted as the outbreak extended throughout the year.

A definition of the term "outbreak," and facts relative to methods of compilation of outbreaks, are printed in foot note on page 248.

*Isolation and Disinfection Restrict Typhoid Fever.*

Typhoid Fever in Michigan in 1893:-Exhibiting the average numbers of cases and deaths per outbreak:- in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced.*(Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)



* Including the disinfection of the bowel discharges of the patients.

[PLATE 780.]

This showing seems to present a forcible argument in favor of the adoption of the preventive measures above referred to, and a strong plea for the coöperation of all the people with physicians and health officers in the efforts inaugurated by the State Board of Health to stamp out this preventable disease.

### AVERAGE DURATION OF TYPHOID FEVER.—FATAL AND NON-FATAL CASES.

TABLE 10.—*Exhibiting by Sex of patient, the average duration (in days) of fatal cases of sickness from Typhoid Fever in Michigan, during the seven years, and during each of the seven years, 1887–93. (Compiled from those reports which stated the length of time the patient was sick.)*

| Fatal cases of Typhoid Fever. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | No. of cases included. | Duration of Sickness:—Per cent of Deaths in each Period of Days.* | | | | | | | | | | | |
| | | | All cases. | Under 10 days. | 10 to 15. | 15 to 20. | 20 to 25. | 25 to 30. | 30 to 35. | 35 to 40. | 40 to 45. | 45 to 50. | 50 to 55. | 55 days and over. |
| 1887. | Males | 81 | 100 | 10 | 7 | 15 | 21 | 16 | 11 | 12 | 2 | 4 | 1 | 0 |
| | Females | 32 | 100 | 31 | 19 | 19 | 16 | 6 | 3 | 0 | 0 | 6 | 0 | 0 |
| 1888. | Males | 40 | 100 | 20 | 13 | 18 | 23 | 10 | 8 | 0 | 5 | 3 | 3 | 0 |
| | Females | 33 | 100 | 24 | 21 | 15 | 12 | 9 | 6 | 3 | 0 | 0 | 9 | 0 |
| 1889. | Males | 42 | 100 | 17 | 14 | 19 | 7 | 14 | 5 | 7 | 2 | 7 | 0 | 7 |
| | Females | 51 | 100 | 18 | 24 | 14 | 16 | 10 | 2 | 6 | 2 | 2 | 0 | 8 |
| 1890. | Males | 57 | 100 | 19 | 9 | 21 | 23 | 5 | 5 | 7 | 0 | 4 | 2 | 5 |
| | Females | 26 | 100 | 19 | 23 | 8 | 8 | 19 | 12 | 0 | 8 | 0 | 0 | 4 |
| 1891. | Males | 80 | 100 | 14 | 20 | 18 | 23 | 10 | 6 | 5 | 1 | 1 | 0 | 3 |
| | Females | 56 | 100 | 20 | 23 | 20 | 11 | 9 | 2 | 5 | 5 | 0 | 0 | 5 |
| 1892. | Males | 92 | 100 | 23 | 21 | 14 | 13 | 14 | 4 | 3 | 8 | ------ | 2 | 2 |
| | Females | 60 | 100 | 28 | 18 | 15 | 15 | 7 | 10 | 5 | 5 | ------ | 2 | ------ |
| 1893. | Males | 94 | 100 | 24 | 15 | 11 | 13 | 11 | 4 | 5 | 3 | 4 | 4 | 5 |
| | Females | 84 | 100 | 25 | 30 | 7 | 13 | 7 | 2 | 6 | 7 | 1 | 0 | 1 |
| Av. 1887-1893. | Males | 69 | 100 | 18 | 14 | 17 | 18 | 11 | 6 | 6 | 2 | 3 | 2 | 3 |
| | Females | 49 | 100 | 23 | 23 | 14 | 13 | 10 | 5 | 4 | 4 | 1 | 2 | 3 |

*In the head of each column showing the periods of days, the first number is included and the last number is not included; as in column 1, under 10 days includes 0 and 9, in the second period 10 and 14 are included, in the next period 15 and 19, etc.

From table 10 it may be seen that, of the 486 males who were reported to have died from typhoid fever within the seven years 1887–93, and of which the interval between the day of being taken sick and day of death was given, the largest per cent of males in any five-year period died in the two periods 15 to 20 and 20 to 25 days of sickness, and that 51 per cent were sick twenty or more days before they died; while, of the 342 females reported as having died in the same time, 23 per cent of the females died before the tenth day, and only 42 per cent were sick longer than nineteen days.

The average duration of the fatal cases in 1893 was in males 24.2 days, and in females 19.5 days.

TABLE 11.—*Exhibiting by Sex of patient, by per cent of cases which recovered in specified periods of time, the Average Duration (in days) of Non-Fatal cases of sickness from Typhoid Fever, in Michigan, during the seven years and during each of the seven years 1887–93. (Compiled from those reports which stated the length of time the patient was sick.)*

| Non-Fatal Cases of Typhoid Fever. | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | No. of cases included. | Duration of Sickness:—Per Cent of Cases in each Period of Days.* | | | | | | | | | | | |
| | | | All Periods. | Under 10 Days. | 10 to 15 | 15 to 20 | 20 to 25 | 25 to 30 | 30 to 35 | 35 to 40 | 40 to 45 | 45 to 50 | 50 to 55 | 55 days and over. |
| 1887. | Males | 203 | 100 | 0 | 5 | 6 | 12 | 16 | 18 | 15 | 9 | 6 | 3 | 8 |
| | Females | 158 | 100 | 0 | 9 | 9 | 19 | 12 | 17 | 11 | 6 | 4 | 3 | 9 |
| 1888. | Males | 164 | 100 | 1 | 4 | 13 | 9 | 13 | 15 | 9 | 10 | 9 | 9 | 7 |
| | Females | 111 | 100 | 0 | 2 | 7 | 14 | 15 | 15 | 19 | 4 | 8 | 10 | 8 |
| 1889. | Males | 166 | 100 | 2 | 7 | 13 | 14 | 16 | 14 | 12 | 9 | 6 | 2 | 5 |
| | Females | 165 | 100 | 6 | 8 | 9 | 14 | 19 | 12 | 11 | 8 | 2 | 2 | 7 |
| 1890. | Males | 226 | 100 | 1 | 4 | 7 | 15 | 18 | 19 | 12 | 10 | 5 | 2 | 8 |
| | Females | 110 | 100 | ...... | 4 | 14 | 16 | 17 | 13 | 14 | 9 | 2 | 5 | 6 |
| 1891. | Males | 463 | 100 | 3 | 5 | 7 | 16 | 19 | 9 | 11 | 11 | 6 | 3 | 11 |
| | Females | 276 | 100 | 2 | 4 | 9 | 14 | 15 | 10 | 14 | 10 | 4 | 5 | 12 |
| 1892. | Males | 329 | 100 | 2 | 4 | 5 | 16 | 22 | 12 | 12 | 11 | 5 | 2 | 9 |
| | Females | 177 | 100 | 2 | 5 | 8 | 15 | 14 | 14 | 9 | 8 | 8 | 4 | 14 |
| 1893. | Males | 410 | 100 | 2 | 5 | 10 | 17 | 18 | 14 | 10 | 9 | 5 | 3 | 7 |
| | Females | 341 | 100 | 2 | 5 | 8 | 17 | 15 | 15 | 14 | 9 | 2 | 4 | 9 |
| Av. 1887–93. | Males | 280 | 100 | 2 | 5 | 9 | 14 | 17 | 14 | 12 | 10 | 6 | 3 | 8 |
| | Females | 191 | 100 | 2 | 5 | 9 | 16 | 15 | 14 | 13 | 8 | 5 | 5 | 9 |

* See star note under table 10.

In Table 11 it may be noticed that in *non-fatal* cases of typhoid fever for the seven years, 1887–93, 61 per cent of the males and 61 per cent of the females recovered before the thirty-fifth day of sickness. The average duration was: males 32 days, females 33 days.

The average duration of all cases in 1893, fatal and non-fatal, was: males 30.7 days, females 30.6 days; and for all cases of both sexes, 30.3 days.

## AGE OF OCCURRENCE OF TYPHOID FEVER.

TABLE 12.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups sick from Typhoid Fever in Michigan, during the seven years and each of the seven years, 1887–93; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

| Year. | Sex. | Average age of persons sick, Years. | No. of cases included. | Age.—In Periods of Years. Per Cent of Cases in each Period of Age.* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | All Ages. | Under 10 Years. | 10 to 15. | 15 to 20. | 20 to 25. | 25 to 30. | 30 to 35. | 35 to 40. | 40 to 45. | 45 to 50. | 50 Years and over. |
| 1887. | Males | 24 | 316 | 100 | 10 | 10 | 14 | 20 | 17 | 9 | 8 | 4 | 2 | 4 |
| | Females | 22 | 245 | 100 | 17 | 10 | 20 | 15 | 10 | 10 | 5 | 4 | 3 | 5 |
| 1888. | Males | 24 | 310 | 100 | 12 | 13 | 15 | 20 | 11 | 11 | 5 | 4 | 3 | 6 |
| | Females | 23 | 199 | 100 | 12 | 22 | 20 | 14 | 8 | 5 | 4 | 6 | 3 | 7 |
| 1889. | Males | 24 | 362 | 100 | 13 | 11 | 17 | 25 | 10 | 8 | 6 | 3 | 2 | 6 |
| | Females | 23 | 310 | 100 | 16 | 17 | 20 | 12 | 8 | 7 | 7 | 4 | 4 | 5 |
| 1890. | Males | 22 | 325 | 100 | 14 | 12 | 16 | 25 | 16 | 7 | 4 | 3 | 2 | 3 |
| | Females | 20 | 199 | 100 | 16 | 16 | 24 | 17 | 11 | 6 | 5 | 1 | 2 | 4 |
| 1891. | Males | 23 | 893 | 100 | 11 | 11 | 16 | 26 | 17 | 8 | 4 | 2 | 2 | 3 |
| | Females | 23 | 553 | 100 | 13 | 20 | 21 | 15 | 10 | 6 | 3 | 3 | 3 | 5 |
| 1892. | Males | 23 | † 711 | 100 | 15 | 9 | 17 | 21 | 16 | 7 | 6 | 3 | 2 | 4 |
| | Females | 20 | † 506 | 100 | 22 | 16 | 22 | 13 | 8 | 6 | 4 | 4 | 2 | 2 |
| 1893. | Males | 22 | 1,073 | 100 | 20 | 10 | 14 | 20 | 18 | 8 | 5 | 2 | 2 | 2 |
| | Females | 17 | 894 | 100 | 21 | 16 | 19 | 16 | 11 | 5 | 3 | 2 | 3 | 4 |
| Av. 1887–93. | Males | 23 | 570 | 100 | 14 | 11 | 16 | 22 | 15 | 8 | 5 | 3 | 2 | 4 |
| | Females | 21 | 416 | 100 | 17 | 17 | 21 | 15 | 9 | 6 | 4 | 3 | 3 | 5 |

* In each age-group the first-mentioned year is included; but the last-mentioned year is not included.

† In the Annual Report for 1893, the figures given for 1892, in Table 11 (Table 12 in this Report) include only the non-fatal cases of which the age and sex were given; whereas in this Report (for 1894) *all* cases, both fatal and non-fatal, are included for 1892, as well as for all the other years treated.

TABLE 13.—*Exhibiting, by Sex, the* **Per Cent** *of persons in certain Age-groups who died of Typhoid Fever during each of the years 1892-3; also the per cent the deaths in each group were of all the deaths from Typhoid Fever.*

| Year. | Sex. | Average age of decedents. Years. | No. of deaths included. | Per Cent of Deaths in certain Age-groups.* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | All Ages. | Under 10 years. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. | 46 to 50. | 51 Years and over. |
| 1892. | Males ---- | 28 | 116 | 100 | 3 | 6 | 18 | 22 | 22 | 8 | 4 | 5 | 3 | 8 |
| | Females--- | 21 | 68 | 100 | 18 | 12 | 31 | 9 | 12 | 7 | 3 | 4 | 1 | 3 |
| 1893. | Males ----- | 28 | 121 | 100 | 7 | 5 | 11 | 24 | 23 | 13 | 7 | 2 | 2 | 5 |
| | Females -- | 23 | 101 | 100 | 13 | 17 | 27 | 11 | 14 | 6 | 3 | 3 | 1 | 6 |
| 1892-93. | Per cent the deaths in each age-group were of all the deaths----- | ------- | 406 | ------ | 10 | 10 | 22 | 17 | 18 | 9 | 4 | 4 | 2 | 6 |

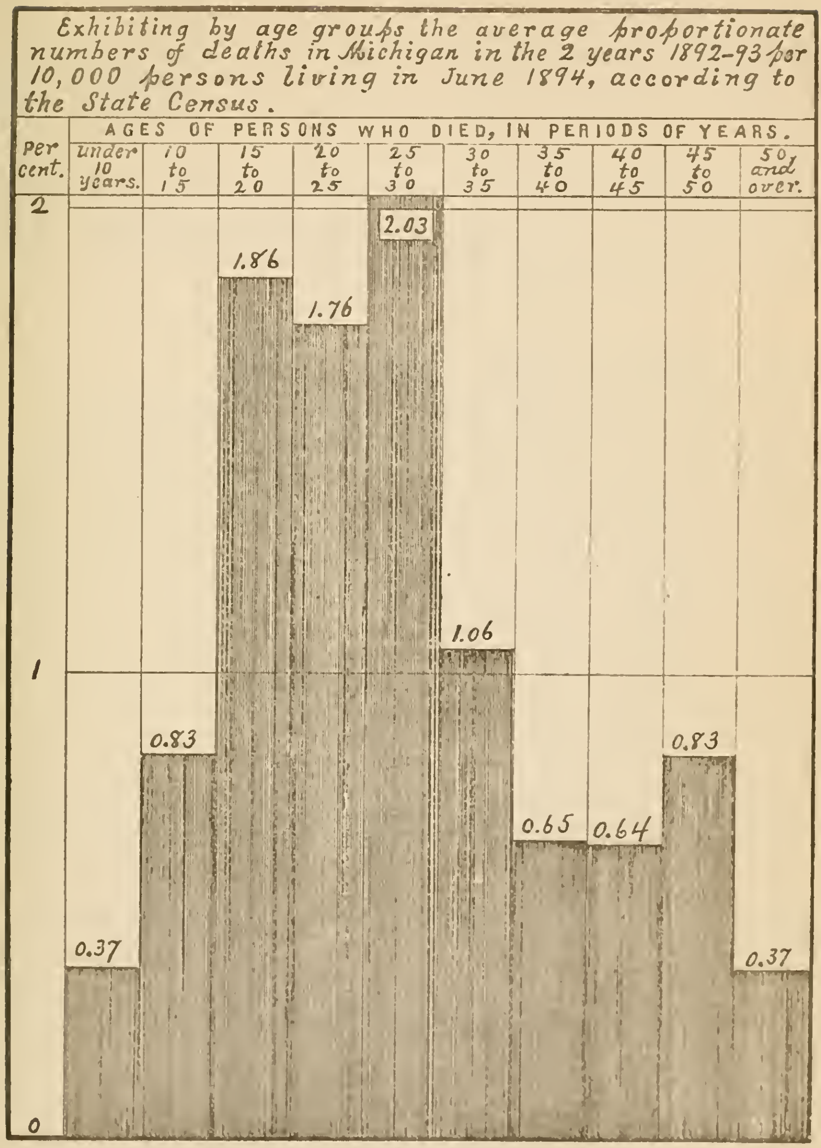
* In each age-group both years are included.

TABLE 14.—*Exhibiting by sex, the* **number** *of persons in certain Age-groups who died of Typhoid Fever during each of the two years, 1892-3; also by Age-groups, the average number of deaths in the two years, 1892-93, per 10,000 persons living, in June, 1894, according to the State Census.*

| | | | | Number of Deaths in Certain Age-groups.* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | Average age of decedents, Years. | No. of Deaths included. | Under 10 Years. | 10 to 15. | 15 to 20. | 20 to 25. | 25 to 30. | 30 to 35. | 35 to 40. | 40 to 45. | 45 to 50. | 50 Years and over. |
| 1892. | Males--------- | 28 | 116 | 4 | 7 | 21 | 26 | 25 | 9 | 5 | 6 | 4 | 9 |
| | Females ---- | 21 | 68 | 12 | 8 | 21 | 6 | 8 | 5 | 2 | 3 | 1 | 2 |
| 1893. | Males-------- | 28 | 121 | 8 | 6 | 13 | 29 | 28 | 16 | 9 | 3 | 3 | 6 |
| | Females ------ | 23 | 101 | 13 | 17 | 27 | 11 | 14 | 6 | 3 | 3 | 1 | 6 |
| 1892-93. | Males--------- | Deaths per 10,000 inhabitants in each age-group. | | .23 | .6 | 2. | 2.62 | 2.9 | 1.4 | .85 | .66 | .61 | .48 |
| | Females ------ | | | .51 | 1.10 | 2.17 | .82 | 1.21 | .68 | .35 | .52 | .20 | .26 |
| 1892-93. | The average number of deaths (both sexes) per 10,000 inhabitants in each age-group for the two years, 1892-93-------------- | | | .37 | .83 | 1.86 | 1.76 | 2.08 | 1.06 | 0.65 | 0.64 | 0.38 | 0.37 |

* In each age-group the first year is included, but not the last.

AGE-DISTRIBUTION OF DECEDENTS FROM TYPHOID FEVER.



[PLATE 787.]

In studying Tables 12 and 13, and first four lines in Table 14, relative to age of persons who died with or who had typhoid fever, it should be held in mind that there are more persons living at the earlier ages than at the more advanced ages. In the last three lines of Table 14, and in the diagram "Age, distribution, etc., this fact is taken account of, and the diagram graphically exhibits the relative danger of death at each period of life, according to the experience in Michigan in the two years 1892–3.

By table 14 it may be seen, that to males the greater danger of death from typhoid fever was in the age-periods 15 to 30 years, especially in the period 25 to 30 years; while the greatest death-rate of females was during the age-period 15 to 20 years.

The average age at death of all persons, both males and females, was 24.74 years.

The last line in Table 14 is graphically exhibited in the diagram "Age-distribution of decedents from Typhoid Fever."

## TWO LINES OF EVIDENCE OF THE PREVALENCE OF TYPHOID FEVER.

In studying the prevalence of typhoid fever in 1893, from the facts presented in the preceding and following pages, it must be borne in mind that those facts are derived from two distinct sources of information:

1.—The numbers of outbreaks, of cases of sickness, and of deaths from typhoid fever are taken from special reports from health officers and other township, city and village officers, during the course of an outbreak, at its close, or in annual reports at the close of the year. If all the people and officers reported as the law provides, the facts presented would represent the *actual numbers* of outbreaks, cases of sickness, and deaths from typhoid fever which occurred in the State during the year; but *all* do not so report. In Detroit, for instance, relative to typhoid fever, only the deaths are reported; of the non-fatal cases we have no knowledge. It is just, however, to state that, as the people generally are becoming better instructed in the measures recommended by the State Board of Health for the saving of life and health, better and more complete reports are made year by year. So, each year, we believe that an increasing proportion of the cases of sickness and deaths from the dangerous communicable diseases are reported to this office. This tends toward an apparent increase in the prevalence of the disease each year, modified, of course, by the real fluctuation in prevalence. While waiting for perfect reports, the facts derived from those now received are valuable for purposes of study.

2.—The prevalence of typhoid fever, or of any given disease, as indicated by the "per cent of reports" is taken from the weekly postal-card reports from regular correspondents of the State Board, health officers of cities and villages, and others. The "per cent of reports" is the per cent of the whole number of reports received which stated the presence of the disease named; it gives the relative prevalence of the disease, under the observation of the physicians who report. It may represent the relative area of prevalence of the disease, combined with the relative number of weeks the disease continued where it did occur, *but not the actual number of cases.*

The weekly card-reports, however, furnish a valuable means of ascertaining, approximately, the relative prevalence of the several diseases in a given year, and the relative prevalence of a given disease in one year compared with other years, and it is as good a scheme for ascertaining the facts as is yet available. Therefore the sickness statistics based upon those weekly card-reports should be relied upon for a comparison of the relative prevalence of typhoid fever in 1893, compared with preceding years. However, the evidence from the two sources may well be compared.

A comparison of the evidence from the two sources, just mentioned, relative to typhoid fever during the years 1885–93, is facilitated by the following Table 15:

TABLE 15.—*By years for the nine years 1885-93, and an average for the 7 years, 1886–92, the per cent of reports (from regular correspondents to the State Board of Health, and others) stating the presence of Typhoid Fever in Michigan; also, for the same years and period of years, the number of outbreaks, number of localities of outbreaks, the cases of sickness and the deaths reported from Typhoid Fever.*

| Years. | Per cent of weekly postal reports stating the presence of typhoid fever. | Reported outbreaks of typhoid fever. | Reported localities of outbreaks of typhoid fever. | Reported cases of sickness from typhoid fever. | Reported deaths from typhoid fever. |
|---|---|---|---|---|---|
| 1885 | 8 | 218 | 200 | 715 | 194 |
| 1886 | 8 | 290 | 282 | 1,194 | 282 |
| 1887 | 10 | 335 | 320 | 2,424 | 411 |
| 1888 | 10 | 316 | 296 | * 1,511 | 310 |
| 1889 | 10 | 432 | 398 | 2,530 | 402 |
| 1890 | 8 | 330 | 310 | 1,924 | 304 |
| 1891 | 11 | 543 | 501 | 4,670 | 697 |
| 1892 | 9 | 527 | 484 | 2,591 | 538 |
| 1893 | 9 | 545 | 504 | 3,512 | 594 |
| Average 7 Years, 1886–92. | 9 | 396 | 370 | 2,406 | 421 |

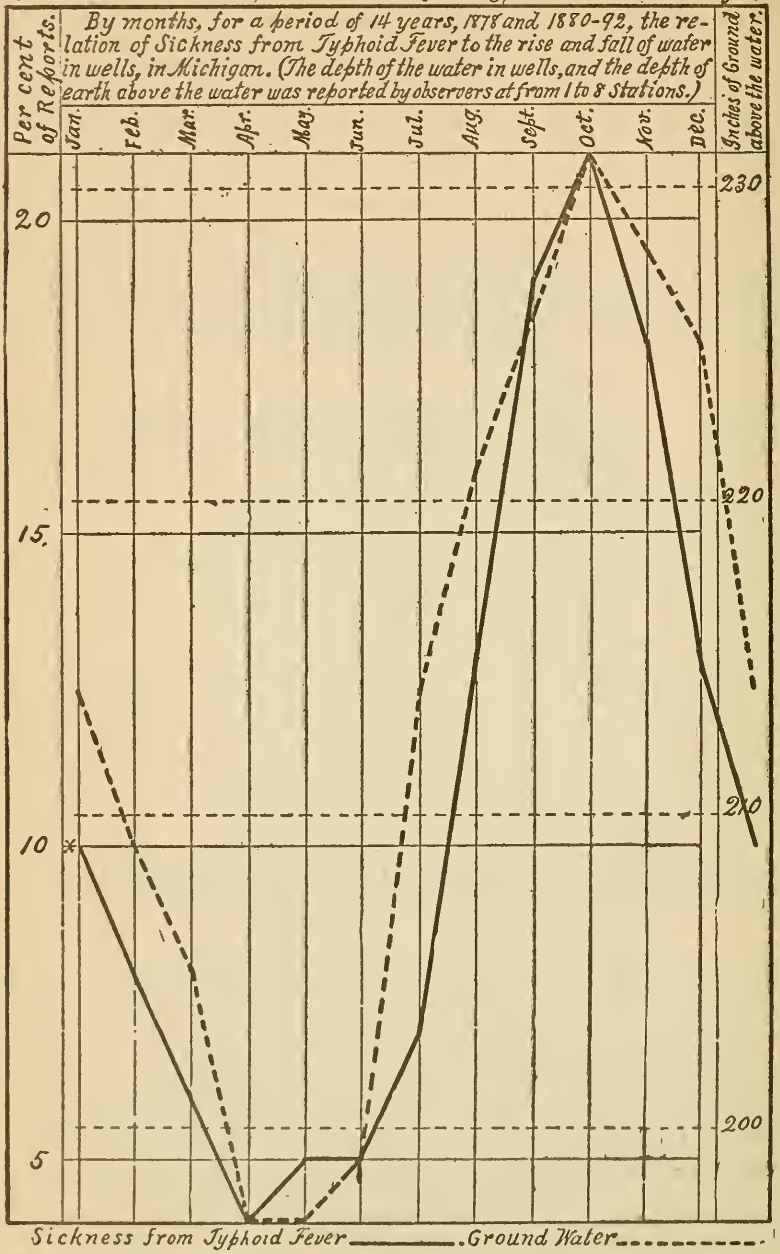
*Inasmuch as it appears that the reported outbreaks and localities in which typhoid fever occurred in 1888 were not very much less than in the preceding year, and were even more than in the year 1886, it is possible that in 1888, the outbreaks of typhoid fever were not allowed to spread as much as in previous years.

Table 19 exhibits the average prevalence of typhoid fever in Michigan by year and months for the ten years, 1878–87, and for each of the nine years, 1885–93, as indicated by the weekly card reports made by regular observers. Table 20 exhibits the rainfall by months and years for the period of ten years, 1878–87, and for each of the nine years, 1885–93.

Table 16 exhibits the relation of low water in wells to sickness (as shown by the weekly card reports) and the reported deaths from typhoid fever in Michigan, for the fifteen years, 1878, 1880–93. The facts presented in two lines of this table, low water in wells and sickness from typhoid fever, for a ten-year period, are graphically represented in a diagram on page 256 of the Annual Report of this Board for 1889.

The diagram on page 300 of this Report graphically represents the relation of the sickness from typhoid fever, to the rise and fall of the water in wells, in Michigan, for the fourteen-year period comprising the years 1878 and 1880–92.

Low Water in Wells, and Sickness from Typhoid Fever in Michigan:



* Indicating what per cent of all reports received stated the presence of Typhoid Fever then under the observation of the physicians reporting.

The danger from typhoid fever is greatest in October, when the water in wells is lowest, and least in April, when the water in wells is highest.

[Plate 681.]

TABLE 16.—*Exhibiting, for Michigan, by Months, during the fifteen years, 1878, 1880–1893,* the relation of low water in wells to sickness from Typhoid Fever; also, the reported number of deaths from Typhoid Fever.*

| Conditions. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Av. inches of ground above the water in wells† | 224 | 218 | 215 | 205 | 201 | 208 | 222 | 229 | 235 | 239 | 236 | 233 |
| Fluctuation from Maximum Depth of water in wells‡ | 20 | 14 | 11 | 1 | 0 | 4 | 18 | 25 | 31 | 35 | 32 | 29 |
| Sickness from Typhoid Fever § | 10 | 7 | 5 | 4 | 5 | 5 | 7 | 13 | 19 | 21 | 18 | 13 |
| Av. number of reported deaths from Typhoid Fever‖ | 26 | 22 | 25 | 27 | 24 | 23 | 29 | 60 | 93 | 104 | 77 | 56 |

* The data relating to the sickness and the deaths from typhoid fever in the years 1878, 1880-93, were used in order to coincide with the same period for which the measurements of ground above the water in wells were already obtained.

† The year 1879 could not be included as, for that year, there was no station from which reports were received for the whole year. The stations used in the compilation of this line, and the years for which reports were received and compiled from each are as follows: Elsie, 1878; Thornville, 1880–1 and 1885–7; Hillsdale, 1880, 1884, 1887–90, 1892–93; Mendon and Union City, 1880; Linden and Dearborn, 1881; Brockway Center, 1882 and 1883; Otisville and Woodland, 1882; Saginaw City, 1883; Kalamazoo, 1884, 1888, and 1889; Lansing, S. B. of H., 1885–93; Ann Arbor, 1886–93; Alpena, 1887–88; Otsego, 1887; Traverse City, 1885–93; Battle Creek, 1888, 1893; River Raisin, 1886–91, 1893.

‡ The Av. "Max. Depth" was in May, because in that month the "Av. inches of earth above the water," was least in that month.

§ Per cent of weekly reports, from observers in different parts of the State, which stated the presence of typhoid fever.

‖ The data used in the compilation of this line were taken from the Registration Reports of Michigan.—Vital Statistics.

TABLE 17.—Height of Ground Water.—*Inches of Earth above the Water—by Months for the nine years, 1885–93, and for the last four months of the year 1884, and for each of the nine years, 1885–93; also averages for the seven years, 1886–92, at* Lansing, *Mich.,—Well in the Capitol Grounds.*

| Period of time. | Year. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1885-93 | 294 | 298 | 298 | 296 | 291 | 291 | 289 | 290 | 292 | 294 | 297 | 298 | 298 |
| 1884 | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | ------ | 290 | 291 | 293 | 292 |
| 1885 | 284 | 288 | 289 | 292 | 280 | 281 | 279 | 282 | 283 | 282 | 285 | 281 | 280 |
| 1886 | 281 | 276 | 278 | 274 | 272 | 273 | 277 | 282 | 287 | 287 | 286 | 291 | 294 |
| 1887 | 290 | 296 | 287 | 280 | 282 | 285 | 288 | 290 | 291 | 291 | 294 | 297 | 294 |
| 1888 | 294 | 292 | 298 | 294 | 293 | 293 | 293 | 293 | 290 | 293 | 297 | 294 | 300 |
| 1889 | 304 | 298 | 304 | 304 | 302 | 304 | 299 | 299 | 302 | 305 | 308 | 311 | 312 |
| 1890 | 300 | 309 | 307 | 305 | 302 | 296 | 292 | 293 | 295 | 300 | 310 | 298 | 300 |
| 1891 | 301 | 302 | 305 | 301 | 295 | 291 | 296 | 297 | 300 | 300 | 304 | 306 | 306 |
| 1892 | 301 | 308 | 307 | 306 | 305 | 300 | 295 | 298 | 293 | 296 | 300 | 304 | 305 |
| 1893 | 295 | 309 | 305 | 304 | 289 | 291 | 284 | 285 | 288 | 293 | 296 | 299 | 292 |
| Av. 7 yrs., 1886-92 | 296 | 297 | 298 | 295 | 293 | 292 | 291 | 292 | 294 | 296 | 298 | 300 | 302 |

Comprehensive study of this subject was made by the Secretary of this Board in a paper read before the American Public Health Association, at St. Louis, Mo., Oct. 16, 1884, which was printed in the Annual Report of this Board for the year 1884, pp. 89–114, and the study was continued subsequently, in the Annual Reports of this Board for the years 1888, pp. lv-lvii; 1889, pp. 254–262; 1890, pp. 247–251.

The evidence is conclusive that there is a necessary relation between the low water in wells and the sickness from typhoid fever.

The fluctuations in the sickness from typhoid fever and the depth of the water in wells are nearly coincident throughout the several months. The maximum of sickness and the minimum of water are coincident in October.

The stations at which the measurements of water in wells are taken and the number of years which are available from each station are stated in the dagger (†) foot-note of Table 16, page 301. This Office has been unable thus far to get accurate measurements of the height of water in wells for a long period of years from many stations in Michigan. This absence of extensive data is especially deplored when a comparison of one year with a series of years is desired, but in the averages for a series of years by *months*, the evidence is accurate and valuable.

It is believed that all the wells from which measurements of water are made for this office, except the well at Lansing, are in regular daily use, as supplies of water. The well at Lansing is not so used; it is in the capitol grounds, far enough from other wells so as not to be liable to be affected by the rise and fall of the water in other wells from daily use, and so would more nearly represent the gradual rise and fall of the *ground water* than would measurements in wells from which water is drawn. But it has been found, by long-continued observations and investigations of the Michigan sickness statistics, contagious-disease statistics, and the reports relative to water in wells, that the rise and fall of the typhoid fever is in much closer relation to the fall and rise of the water in wells in actual use than to the fluctuations in the well at Lansing.

TABLE 18.—*Exhibiting the number of Inches of Earth above the ground water in Lansing, by months, for the eight years 1886–93, compared with the per cent of reported cases and outbreaks of Typhoid Fever in Michigan, for each month; also the total number of cases and outbreaks reported for those years. (Compiled from those cases of which the date of occurrence was given; and from those outbreaks of which the time of beginning was stated.)*

| Specifications relative to ground water and Typhoid Fever. | Year. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | No. of cases and outbreaks included in this table. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inches of earth above the water, year 1886 |  | 276 | 278 | 274 | 272 | 273 | 277 | 282 | 287 | 287 | 286 | 291 | 294 |  |
| Per cent of cases of typhoid fever reported, year 1886* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Per cent of outbreaks which began in each month, 1886 | 100 | 6 | 4 | 4 | 2 | 2 | 4 | 11 | 15 | 26 | 11 | 11 | 5 | 253 |
| Inches of earth above the water, year 1887 |  | 296 | 287 | 280 | 282 | 285 | 288 | 290 | 291 | 291 | 294 | 297 | 294 |  |
| Per cent of cases of typhoid fever reported, year 1887 | 100 | 2 | 1 | 1 | 1 | 2 | 3 | 8 | 20 | 24 | 19 | 12 | 7 | 1,096 |
| Per cent of outbreaks which began in each month, 1887 | 100 | 5 | 2 | 2 | 3 | 6 | 4 | 12 | 23 | 20 | 11 | 9 | 3 | 289 |
| Inches of earth above the water, year 1888 |  | 292 | 298 | 294 | 293 | 293 | 293 | 293 | 290 | 293 | 297 | 294 | 300 |  |
| Per cent of cases of typhoid fever reported, year 1888 | 100 | 5 | 3 | 2 | 3 | 3 | 4 | 7 | 13 | 18 | 23 | 11 | 9 | 809 |
| Per cent of outbreaks which began in each month, 1888 | 100 | 7 | 5 | 3 | 3 | 4 | 6 | 12 | 15 | 16 | 15 | 6 | 7 | 265 |
| Inches of earth above the water, year 1889 |  | 298 | 304 | 304 | 302 | 304 | 299 | 289 | 302 | 305 | 308 | 311 | 312 |  |
| Per cent of cases of typhoid fever reported, year 1889 | 100 | 1 | 2 | 1 | 2 | 1 | 2 | 4 | 12 | 28 | 24 | 15 | 7 | 1,248 |
| Per cent of outbreaks which began in each month, 1889 | 100 | 4 | 2 | 8 | 2 | 2 | 5 | 8 | 17 | 21 | 19 | 11 | 6 | 382 |
| Inches of earth above the water, year 1890 |  | 309 | 307 | 305 | 302 | 296 | 292 | 293 | 295 | 300 | 300 | 298 | 300 |  |
| Per cent of cases of typhoid fever reported, year 1890 | 100 | 5 | 2 | 2 | 3 | 2 | 2 | 7 | 23 | 18 | 17 | 12 | 6 | 1,089 |
| Per cent of outbreaks which began in each month, 1890 | 100 | 5 | 4 | 3 | 8 | 6 | 5 | 9 | 25 | 13 | 15 | 6 | 5 | 253 |
| Inches of earth above the water, year 1891 |  | 302 | 305 | 301 | 295 | 294 | 296 | 297 | 300 | 300 | 304 | 306 | 306 |  |
| Per cent of cases of typhoid fever reported, year 1891 | 100 | 6 | 2 | 1 | 2 | 2 | 2 | 5 | 14 | 24 | 23 | 13 | 6 | 1,464 |
| Per cent of outbreaks which began in each month, 1891 | 100 | 6 | 3 | 2 | 3 | 4 | 5 | 8 | 20 | 18 | 19 | 9 | 4 | 454 |
| Inches of earth above the water, year 1892 |  | 308 | 307 | 306 | 305 | 300 | 295 | 293 | 293 | 296 | 300 | 304 | 305 |  |
| Per cent of cases of typhoid fever reported, year 1892 | 100 | 5 | 4 | 5 | 5 | 3 | 4 | 5 | 8 | 17 | 22 | 13 | 9 | 2,482 |
| Per cent of outbreaks which began in each month, 1892 | 100 | 10 | 3 | 3 | 3 | 4 | 5 | 8 | 16 | 16 | 15 | 7 | 9 | 462 |
| Inches of earth above the water, year 1893 |  | 309 | 305 | 304 | 298 | 291 | 284 | 285 | 288 | 293 | 296 | 299 | 292 |  |
| Per cent of cases of typhoid fever reported, year 1893 | 100 | 2 | 2 | 3 | 2 | 5 | 13 | 8 | 15 | 18 | 15 | 10 | 6 | 2,237 |
| Per cent of outbreaks which began in each month, 1893 | 100 | 8 | 8 | 3 | 3 | 8 | 8 | 7 | 16 | 20 | 15 | 8 | 5 | 469 |

*The per cent of cases in each month was not completed in 1886.

TABLE 19.—TYPHOID FEVER IN MICHIGAN.—*Average per cent of weekly card-reports stating the presence of Typhoid Fever, by year and Months for the Ten years, 1878–87, and in each of the nine years, 1885–93; also, the average for the seven years, 1886–92.*

| Period of Time. | Year. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Av. 10 yrs., 1878–87* | 12 | 10 | 9 | 7 | 5 | 5 | 5 | 7 | 14 | 20 | 22 | 20 | 14 |
| 1885 | † 8 | 11 | 7 | 5 | 4 | 3 | 5 | 5 | 6 | 11 | 13 | 16 | 8 |
| 1886 | † 8 | 6 | 3 | 4 | 3 | 5 | 4 | 5 | 13 | 16 | 16 | 13 | 10 |
| 1887* | 10 | 6 | 10 | 4 | 3 | 3 | 4 | 8 | 14 | 22 | 18 | 15 | 11 |
| 1888 | 10 | 10 | 7 | 6 | 5 | 4 | 5 | 7 | 12 | 18 | 16 | 12 | 10 |
| 1889 | 10 | 8 | 5 | 3 | 3 | 4 | 5 | 5 | 12 | 19 | 25 | 19 | 12 |
| 1890 | 8 | 6 | 1 | 2 | 2 | 2 | 5 | 6 | 15 | 15 | 16 | 13 | 7 |
| 1891 | 11 | 5 | 5 | 2 | 2 | 3 | 3 | 6 | 12 | 21 | 27 | 21 | 15 |
| 1892 | 9 | 7 | 5 | 4 | 4 | 3 | 4 | 5 | 13 | 16 | 17 | 11 | 12 |
| 1893 | 9 | 6 | 4 | 3 | 3 | 4 | 6 | 7 | 12 | 16 | 23 | 20 | 8 |
| Av. 7 yrs., 1886–92 | 9 | 7 | 5 | 4 | 3 | 3 | 4 | 6 | 13 | 18 | 19 | 15 | 11 |

* The figures in the line for 1887, and in the line for the average for the ten years, 1878-87, in this table do not all exactly agree with those in the same lines in the table printed on page lvi, of the report of this Board for the year 1888, for the reason that the table printed in the Report for 1888 was made before the cards were all compiled for the *year*, and was taken from the compilation (of the card reports first received) for the quarterly reports. The line "Average 10 years 1878-87," included the data for the year 1887 and consequently is not exactly, although it is substantially, the same as in the above table.

† Since May, 1885, physicians have reported only the prevalence of diseases under their *own observation*. Previous to that time diseases which were *believed* to be present (under the care of other physicians) were so reported. This undoubtedly accounts for a part of the sudden decrease in 1885 and 1886 as compared with the preceding years.

TABLE 20.—RAINFALL IN MICHIGAN.—*Average number of Inches, by Months, for the ten years, 1878-87, and in each of the nine years, 1885–93; also averages for the seven years, 1886–92.*

| Period of Time. | Year. | Jan. | Feb. | Mar. | Apr. | May | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Av. 10 yrs., 1878-87 | 37.27 | 2.09 | 2.89 | 2.28 | 2.49 | 3.52 | 4.24 | 3.44 | 3.21 | 3.72 | 3.45 | 2.93 | 2.69 |
| 1885 | 35.82 | 2 70 | .73 | .58 | 2.47 | 2.30 | 6.01 | 2.52 | 5.82 | 3.75 | 3.08 | 2.90 | 2.14 |
| 1886 | 32.16 | 3.05 | 1.72 | 2.74 | 2.40 | 2.58 | 2.29 | 1.86 | 4.21 | 5.36 | 1.97 | 2.35 | 2.13 |
| 1887 | 29.82 | 2.27 | 4.47 | 1.18 | 1.54 | 2.25 | 2.76 | 2 46 | 1.98 | 2.84 | 2.43 | 2.10 | 2.55 |
| 1888 | 29 55 | 1.99 | 1.77 | 2.51 | 2.15 | 3.73 | 2.87 | 2.02 | 2.38 | 2.66 | 2.68 | 2.92 | 1.89 |
| 1889 | 28.18 | 2.42 | 2.01 | 1.01 | 1.62 | 4.21 | 3.82 | 3.07 | .98 | 1.85 | 1.10 | 3.10 | 2.96 |
| 1890 | 30.20 | 3.53 | 2.40 | 2.12 | 3.37 | 4.80 | 3.74 | 1.47 | 3.62 | 2.09 | 4.97 | 2.43 | 1.70 |
| 1891 | 31.66 | 1.91 | 3.13 | 2.74 | 2.03 | 1.33 | 2.53 | 2.55 | 4.41 | 1.92 | 1.71 | 4.86 | 2.54 |
| 1892 | 33.08 | 1.95 | 2.16 | 1.39 | 2.16 | 5.45 | 5.17 | 2 39 | 2.92 | 3.01 | 1.40 | 3.14 | 1.95 |
| 1893 | 36.31 | 2.34 | 2.78 | 2.40 | 4.77 | 2.91 | 3.55 | 2.88 | 1.22 | 2.52 | 4.24 | 3.05 | 3.74 |
| Av. 7 yrs., 1886-92 | 30.66 | 2.45 | 2.53 | 1.96 | 2.18 | 3.48 | 3.31 | 2.19 | 2.93 | 2.82 | 2.33 | 2.99 | 2.25 |

TABLE 21.—TEMPERATURE OF THE WATER *in the Well at the State Capitol in* Lansing, *Mich., by Months for the nine years, 1885–93, and the last four months of the year 1884; also averages for the 7 years, 1886–92.*

| Year and period of years. | Year. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1884 | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | 50 | 51 | 51 | 49 |
| 1885 | 47 | 49 | 47 | 43 | 42 | 46 | 48 | 47 | 48 | 50 | 50 | 51 | 45 |
| 1886 | 48 | 49 | 47 | 46 | 45 | 46 | 46 | 47 | 50 | 52 | 52 | 51 | 50 |
| 1887 | 48 | 50 | 41 | 42 | 46 | 47 | 48 | 49 | 51 | 50 | 51 | 52 | 51 |
| 1888 | 49 | 50 | 49 | 48 | 47 | 48 | 48 | 47 | 50 | 51 | 51 | 52 | 51 |
| 1889 | 50 | 50 | 49 | 49 | 48 | 49 | 49 | 50 | 50 | 50 | 51 | 51 | 51 |
| 1890 | 50 | 50 | 49 | 49 | 48 | 49 | 49 | 49 | 50 | 51 | 51 | 52 | 51 |
| 1891 | 50 | 50 | 49 | 49 | 48 | 49 | 49 | 49 | 50 | 51 | 51 | 51 | 51 |
| 1892 | 50 | 50 | 50 | 49 | 49 | 49 | 50 | 49 | 50 | 51 | 53 | 52 | 52 |
| 1893 | 50 | 50 | 48 | 47 | 48 | 48 | 49 | 49 | 50 | 51 | 52 | 52 | 51 |
| Av. 7 yrs., 1886–92 | 49 | 50 | 48 | 47 | 47 | 48 | 48 | 49 | 50 | 51 | 51 | 52 | 51 |

TABLE 22.—*Sickness from Typhoid Fever in Michigan (as indicated by the weekly card reports by all observers) and the depth of earth (in inches) above the water in the well, and the temperature of the water in the well, at* Lansing, *Michigan, averages by Year and Months for the seven years, 1886–92.*

| | Year. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sickness from Typhoid Fever* | 9 | 7 | 5 | 4 | 3 | 3 | 4 | 6 | 13 | 18 | 19 | 15 | 11 |
| Inches of earth above water in well† | 296 | 297 | 298 | 295 | 293 | 292 | 291 | 292 | 294 | 296 | 298 | 300 | 302 |
| Temperature of water in well‡ | 49 | 50 | 48 | 47 | 47 | 48 | 48 | 49 | 50 | 51 | 51 | 52 | 51 |

* Per cent of all reports received (from observers in different parts of the State) which stated the presence of typhoid fever.

† This line is copied from the last line in Table 19.

‡ This line is copied from the last line in Table 21.

From Table 22 it may be seen that the relation of sickness from typhoid fever to the ground water, as represented by the depth of water in the unused well at Lansing, is not so close as that which exists between sickness from typhoid fever and low water in wells in use, which is shown in table 18, on page 303, of this Report. It is still possible, however, that if we could obtain measurements of water in *unused* wells in the different localities whence the reports of typhoid fever are derived, or could we have a full and correct report of all cases of the disease which occurred in Lansing during the same period for which we have measurements of the well there, and before there was a general water supply in Lansing, comparison of those data might show the existence of as close affinity between low *ground-water* and typhoid fever, as exists between typhoid and *low water in wells.*

In Table 22 the average sickness (according to the weekly card-reports) from typhoid fever in Michigan during the seven years 1886–92, is shown, by months, in comparison with the average depth of water in the representative well at Lansing, and with the average temperature of the water in the same well.

TABLE 23.—*Exhibiting the Average Total Annual Rainfall at Stations in Michigan, the same for Lansing, the inches of earth above the ground water at* Lansing, *the inches of water in an undisturbed well at Lansing, and the reported sickness, from Typhoid Fever in Michigan, as indicated by the per cent of all the weekly card reports which stated the presence of Typhoid Fever, during each of the 9 years, 1885–93, and averages for the 7 years, 1886–92.*

| Year, and period of years. | Average total Annual Rainfall at Stations in Michigan, in inches. | Total Annual Rainfall at Lansing, in inches. | Inches of earth above the Ground Water at Lansing. | Inches of water in an unused well at Lansing. | Ground Water higher (+) or lower (—) than the seven years' Average in inches. | Average Per Cent of all weekly card-reports stating the presence of Typhoid Fever. | More (+) or less (—) Sickness from Typhoid Fever than the seven years' Average. |
|---|---|---|---|---|---|---|---|
| 1885 | 35.82 | 34.51 | 284 | 40 | +11 | 8 | —1 |
| 1886 | 32.16 | 29.52 | 281 | 42 | +15 | 8 | —1 |
| 1887 | 29.82 | 30.08 | 290 | 34 | +6 | 10 | +1 |
| 1888 | 29.55 | 25.76 | 294 | 29 | +2 | 10 | +1 |
| 1889 | 28.18 | 23.28 | 304 | 19 | —8 | 10 | +1 |
| 1890 | 30.20 | 33.96 | 300 | 28 | —4 | 8 | —1 |
| 1891 | 31.66 | 29.05 | 301 | 23 | —5 | 11 | +2 |
| 1892 | 33.08 | 31.97 | 301 | 23 | —5 | 9 | = |
| 1893 | 36.34 | 39.52 | 295 | 28 | +1 | 9 | = |
| Av. 7 yrs., 1886 92 | 30.66 | 29.09 | 296 | 28 | ............ | 9 | ............ |

# MEASLES IN MICHIGAN.—DURING THE YEAR ENDING DECEMBER 31, 1893.

There were reported to the Secretary of the State Board of Health in all 365 outbreaks of measles, in 326 local jurisdictions, as having occurred in Michigan during the year 1893; and in these outbreaks there were reported to have occurred 7,334[*] cases and 119[*] deaths. For the preceding year, 1892, there were reported 3,830 cases and 76 deaths in 229 local jurisdictions. The Office of the State Board of Health is making almost constant efforts to get local health officials to take measures to prevent the spread of measles, and to make reports to this office concerning that disease in their localities, and it is probable that a larger proportion of the actual numbers of cases and deaths were reported in 1893 than in previous years.[†]

### DISTRIBUTION OF MEASLES IN 1893.

The following Tables, 1 and 2, and accompanying map, exhibit, in different ways, the distribution of the reported measles in Michigan, in 1893. Table 1 shows that the sickness-rate from this disease, for the year, for the whole State, was 33.3 cases per 10,000 of estimated population; and that the death-rate per same number of inhabitants, was .5. Table 1, shows also that the greatest sickness-rate from this disease, in 1893, was in Keweenaw county, where the ratio of cases to population was 279.4 to 10,000. Other counties where the sickness-rates were largely in excess of the average rate for the State, were: Branch, 243.6; Lenawee, 186.5; Allegan, 180.2; Calhoun, 154.9; Kalkaska, 135.9; Marquette, 132.1; Charlevoix, 125.2; Cheboygan, 114.0, and Lapeer, 111.9 cases per 10,000 of population. The lowest sickness-rate for the year, .4 cases per 10,000 of population, was in Manistee county. Other counties whose sickness-rates were much *below* the average for the State, were: Macomb, .6; Livingston, 1.0; Mason, 1.1; Alpena, 1.2; Ontonagon, 1.6; Muskegon, 1.8; Otsego, 2.1; Osceola, 2.5; Ingham, 2.8; Clare, 3.8, cases per 10,000 of population. The greatest death-rate from this disease during the year, 10.9 deaths per 10,000 of population, was in Oscoda county. Other counties where the death-rates were much above the average death-rate for the State, were: Delta, 7.7; Missaukee, 6.2; Benzie, 2.7; Branch, 2.7, deaths per 10,000 of population. The lowest death-rate, in counties where deaths occurred, .1 of one death per 10,000 of population, was in Saginaw county. Other counties where the death-rates were much *below* the average death-rate for the State, were: Houghton, .2; Bay and Monroe, .3; Calhoun, .4 of one death per 10,000 of population.

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[*] Only the 37 cases which died were reported from the city of Detroit. If in that city the deaths were the same per cent of the cases as were reported for the rest of the State (1.1 per cent) 3,293 cases of measles occurred in that city during the year 1893, making the number of cases for the whole State 10,627, instead of 7,334 as given above. But not all of the cases or deaths from measles were reported, as is evidenced in the note following this.

[†] Not all of the cases and deaths are yet reported; this is evident from the fact that for the year 1893 there were reported to the Secretary of State 127 deaths from measles; and it is well known that not all deaths are reported to the Secretary of State. The Secretary of the State Board of Health estimates that in order to equal the actual number of deaths, the deaths reported to the Secretary of State should be increased by forty per cent. If this is done, the probable number of deaths from measles in 1893 is found to be 178.

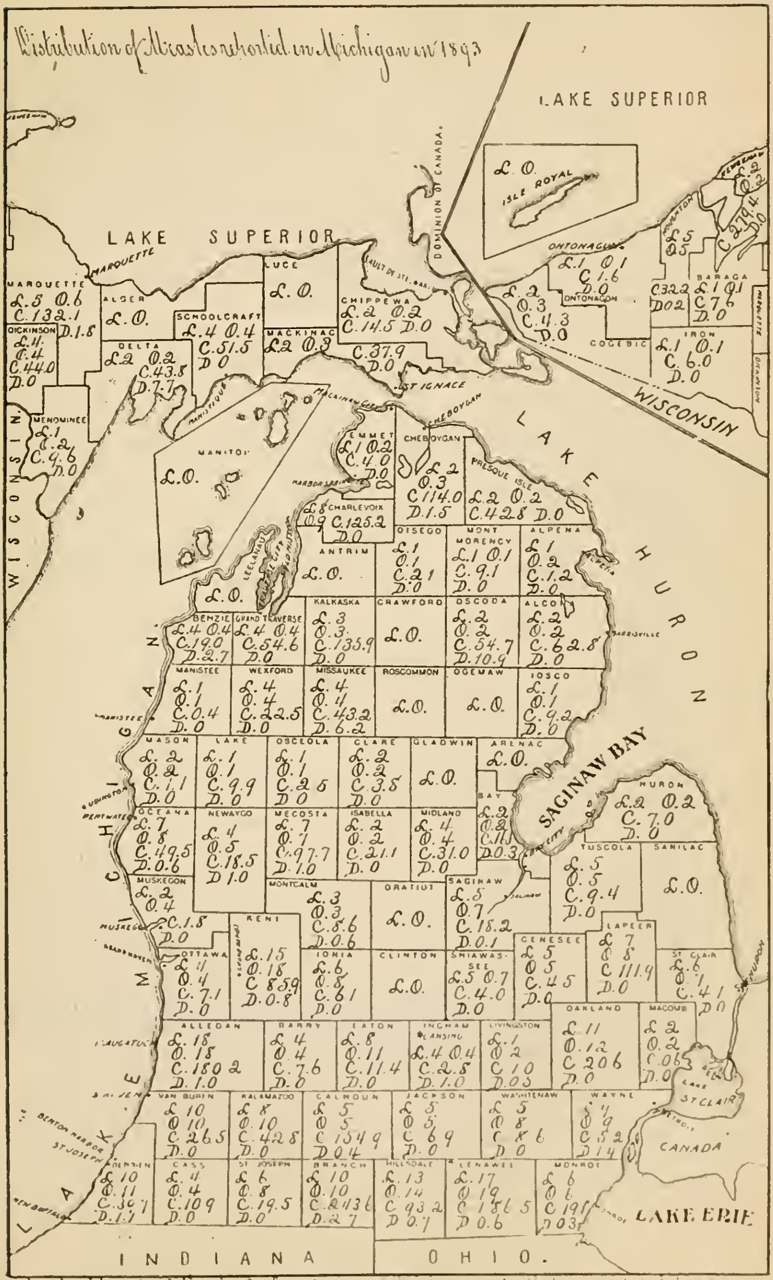
TABLE 1.—*Numbers of Cases and Deaths reported from Measles per 10,000 persons living in each county in Michigan during the year 1893. (Compiled from reports of health officers, clerks, etc.)*

| Counties. | Estimated* population of Michigan for 1893. | Number of reported | | Number per 10,000 population, of | |
|---|---|---|---|---|---|
| | | Cases. | Deaths. | Cases. | Deaths. |
| State | 2,204,563 | 7,334 | 119 | 33.3 | 0.5 |
| Alcona | 5,411 | 34 | 0 | 62.8 | 0 |
| Alger | 1,348 | 0 | 0 | 0 | 0 |
| Allegan | 39,129 | 705 | 4 | 180.2 | 1.0 |
| Alpena | 17,182 | 2 | 0 | 1.2 | 0 |
| Antrim | 11,924 | 0 | 0 | 0 | 0 |
| Arenac | 6,627 | 0 | 0 | 0 | 0 |
| Baraga | 3,933 | 3 | 0 | 7.6 | 0 |
| Barry | 23,720 | 18 | 0 | 7.6 | 0 |
| Bay | 60,072 | 97 | 2 | 16.1 | .3 |
| Benzie | 7,354 | 14 | 2 | 19 0 | 2.7 |
| Berrien | 44,542 | 177 | 5 | 39.7 | 1.1 |
| Branch | 26,351 | 642 | 7 | 243.6 | 2.7 |
| Calhoun | 46,479 | 72 | 2 | 154.9 | 0.4 |
| Cass | 21,120 | 23 | 0 | 10.9 | 0 |
| Charlevoix | 10,620 | 134 | 0 | 125.2 | 0 |
| Cheboygan | 13,419 | 153 | 2 | 114.0 | 1.5 |
| Chippewa | 14,494 | 21 | 0 | 14.5 | 0 |
| Clare | 7,871 | 3 | 0 | 3.8 | 0 |
| Clinton | 26,324 | 0 | 0 | 0 | 0 |
| Crawford | 2,773 | 0 | 0 | 0 | 0 |
| Delta | 18,277 | 80 | 14 | 43.8 | 7.7 |
| Dickinson | 14,774 | 65 | 0 | 44.0 | 0 |
| Eaton | 32,483 | 37 | 0 | 11.4 | 0 |
| Emmet | 9,975 | 4 | 0 | 4.0 | 0 |
| Genesee | 40,272 | 18 | 0 | 4.5 | 0 |
| Gladwin | 4,727 | 0 | 0 | 0 | 0 |
| Gogebic | 13,854 | 6 | 0 | 4.3 | 0 |
| Gd. Traverse | 16,474 | 90 | 0 | 54.6 | 0 |
| Gratiot | 28,745 | 0 | 0 | 0 | 0 |
| Hillsdale | 30,368 | 283 | 2 | 93.2 | 0.7 |
| Houghton | 41,978 | 135 | 1 | 32.2 | 0.2 |
| Huron | 31,323 | 22 | 0 | 7.0 | 0 |
| Ingham | 39,183 | 11 | 4 | 2.8 | 1.0 |
| Ionia | 34,313 | 21 | 0 | 6.1 | 0 |
| Iosco | 13,060 | 12 | 0 | 9.2 | 0 |
| Iron | 4,974 | 3 | 0 | 6.0 | 0 |
| Isabella | 20,775 | 44 | 0 | 21.1 | 0 |
| Isle Royal | 0 | 0 | 0 | 0 | 0 |
| Jackson | 46,158 | 32 | 0 | 6 9 | 0 |
| Kalamazoo | 41,860 | 177 | 0 | 42.8 | 0 |
| Kalkaska | 5,518 | 75 | 0 | 135.9 | 0 |
| Kent | 118,920 | 1,012 | 9 | 85.9 | 0.8 |
| Keweenaw | 2,827 | 79 | 0 | 279.4 | 0 |
| Lake | 6,048 | 6 | 0 | 9.9 | 0 |
| Lapeer | 28,959 | 324 | 0 | 111.9 | 0 |
| Leelanaw | 9,032 | 0 | 0 | 0 | 0 |
| Lenawee | 48,518 | 905 | 3 | 186.5 | 0.6 |
| Livingston | 20,541 | 2 | 1 | 1.0 | 0.5 |
| Luce | 2,375 | 0 | 0 | 0 | 0 |
| Mackinac | 7,385 | 29 | 0 | 37.9 | 0 |
| Macomb | 32,240 | 2 | 0 | 0.6 | 0 |
| Manistee | 25,642 | 1 | 0 | 0.4 | 0 |
| Maniton | 908 | 0 | 0 | 0 | 0 |
| Marquette | 38,004 | 502 | 7 | 132.1 | 1.8 |
| Mason | 17,910 | 2 | 0 | 1.1 | 0 |
| Mecosta | 20,472 | 200 | 2 | 97.7 | 1.0 |
| Menominee | 22,945 | 22 | 0 | 9.6 | 0 |
| Midland | 12,582 | 39 | 0 | 31.0 | 0 |
| Missaukee | 6,479 | 28 | 4 | 43.2 | 6.2 |
| Monroe | 32,969 | 63 | 1 | 19.1 | 0.3 |
| Montcalm | 33,776 | 29 | 2 | 8.6 | 0.6 |
| Montmorency | 2,198 | 2 | 0 | 9.1 | 0 |
| Muskegon | 37,996 | 7 | 0 | 1.8 | 0 |
| Newaygo | 19,462 | 36 | 2 | 18.5 | 1.0 |
| Oakland | 42,312 | 87 | 0 | 20.6 | 0 |
| Oceana | 16,372 | 81 | 1 | 49.5 | 0.6 |
| Ogemaw | 5,623 | 0 | 0 | 0 | 0 |
| Ontonagon | 6,094 | 1 | 0 | 1.6 | 0 |
| Osceola | 16,014 | 4 | 0 | 2.5 | 0 |
| Oscoda | 1,829 | 10 | 2 | 54.7 | 10.9 |
| Otsego | 4,664 | 1 | 0 | 2.1 | 0 |
| Ottawa | 38,146 | 27 | 0 | 7.1 | 0 |
| Presque Isle | 5,604 | 24 | 0 | 42.8 | 0 |
| Roscommon | 1,751 | 0 | 0 | 0 | 0 |
| Saginaw | 81,949 | 149 | 1 | 18.2 | 0.1 |
| Sanilac | 33,605 | 0 | 0 | 0 | 0 |
| Schoolcraft | 6,800 | 35 | 0 | 51.5 | 0 |
| Shiawassee | 32,358 | 13 | 0 | 4.0 | 0 |
| St. Clair | 53,763 | 22 | 0 | 4.1 | 0 |
| St. Joseph | 25,154 | 49 | 0 | 19.5 | 0 |
| Tuscola | 33,965 | 32 | 0 | 9.4 | 0 |
| Van Buren | 30,930 | 82 | 0 | 26.5 | 0 |
| Washtenaw | 43,171 | 37 | 0 | 8.6 | 0 |
| Wayne | 283,650 | 147 | 39 | 5.2 | 1.4 |
| Wexford | 13,355 | 30 | 0 | 22.5 | 0 |

* By Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan "State Department." Estimate based on the United States census of 1890, and the State census of 1894, "Vital Statistics," 1893, pp. 17-19. (Computed by arithmetical method, average annual increase.)

## DISTRIBUTION OF MEASLES IN MICHIGAN IN 1893.

BY COUNTIES, THE REPORTED CASES AND DEATHS PER 10,000 INHABITANTS


Distribution of Measles reported in Michigan in 1893
LAKE SUPERIOR
DOMINION OF CANADA.
L. O. ISLE ROYAL
KEWEENAW L. 2 O. 2 C. 279.4 D. 0
HOUGHTON L. 5 O. 5 C. 32.2 D. 0.2
ONTONAGON L. 1 O. 1 C. 1.6 D. 0
GOGEBIC L. 2 O. 3 C. 4.3 D. 0
BARAGA L. 1 O. 1 C. 7.6 D. 0
IRON L. 1 O. 1 C. 6.0 D. 0
MARQUETTE
FLORENCE
WISCONSIN
LAKE SUPERIOR
MARQUETTE L. 5 O. 6 C. 132.1 D. 1.8
DICKINSON L. 4. O. 4 C. 44.0 D. 0
ALGER L. O.
LUCE L. O.
SCHOOLCRAFT L. 4 O. 4 C. 51.5 D. 0
DELTA L. 2 O. 2 C. 43.8 D. 7.7
MENOMINEE L. 1 O. 2 C. 9.6 D. 0
MACKINAC L. 2 O. 3 C. 37.9 D. 0
CHIPPEWA L. 2 O. 2 C. 14.5 D. 0
SAULT DE STE. MARIE
ST IGNACE
MANISTIQUE
MACKINAW CITY
CHEBOYGAN
MANITOU L. O.
EMMET L. 1 O. 2 C. 4.0 D. 0
HARBOR SPRINGS
CHEBOYGAN L. 2 O. 3 C. 114.0 D. 1.5
PRESQUE ISLE L. 2 O. 2 C. 42.8 D. 0
CHARLEVOIX L. 8 O. 9 C. 125.2 D. 0
LEELANAU L. O.
TRAVERSE CITY
ANTRIM L. O.
OTSEGO L. 1 O. 1 C. 2.1 D. 0
MONTMORENCY L. 1 O. 1 C. 9.1 D. 0
ALPENA L. 1 O. 2 C. 1.2 D. 0
BENZIE L. 4 O. 4 C. 19.0 D. 2.7
GRAND TRAVERSE L. 4 O. 4 C. 54.6 D. 0
KALKASKA L. 3 O. 3. C. 135.9 D. 0
CRAWFORD L. O.
OSCODA L. 2 O. 2 C. 54.7 D. 10.9
ALCONA L. 2 O. 2 C. 62.8 D. 0
HARRISVILLE
MANISTEE L. 1 O. 1 C. 0.4 D. 0
WEXFORD L. 4 O. 4 C. 22.5 D. 0
MISSAUKEE L. 4 O. 4 C. 43.2 D. 6.2
ROSCOMMON L. O.
OGEMAW L. O.
IOSCO L. 1 O. 1 C. 9.2 D. 0
LAKE HURON
MASON L. 2 O. 2 C. 1.1 D. 0
LAKE L. 1 O. 1 C. 9.9 D. 0
OSCEOLA L. 1 O. 1 C. 2.6 D. 0
CLARE L. 2 O. 2 C. 3.8 D. 0
GLADWIN L. O.
ARENAC L. O.
SAGINAW BAY
BAY L. 2 O. 2 C. 11 D. 0.3
BAY CITY
HURON L. 2 O. 2 C. 7.0 D. 0
LUDINGTON
PENTWATER
OCEANA L. 7 O. 8 C. 49.5 D. 0.6
NEWAYGO L. 4 O. 5 C. 18.5 D. 1.0
MECOSTA L. 7 O. 7 C. 97.7 D. 1.0
ISABELLA L. 2 O. 2 C. 21.1 D. 0
MIDLAND L. 4 O. 4 C. 31.0 D. 0
TUSCOLA L. 5 O. 5 C. 9.4 D. 0
SANILAC L. O.
MUSKEGON L. 2 O. 4 C. 1.8 D. 0
MUSKEGON
MONTCALM L. 3 O. 3 C. 8.6 D. 0.6
GRATIOT L. O.
SAGINAW L. 5 O. 7 C. 18.2 D. 0.1
SAGINAW
GRAND HAVEN
KENT L. 15 O. 18 C. 85.9 D. 0.8
GRAND RAPIDS
OTTAWA L. 4 O. 4 C. 7.1 D. 0
IONIA L. 6 O. 8 C. 6.1 D. 0
CLINTON L. O.
SHIAWASSEE L. 5 O. 7 C. 4.0 D. 0
GENESEE L. 5 O. 5 C. 4.5 D. 0
LAPEER L. 7 O. 8 C. 111.9 D. 0
ST CLAIR L. 6 O. 7 C. 4.1 D. 0
PORT HURON
SAUGATUCK
ALLEGAN L. 18 O. 18 C. 180.2 D. 1.0
BARRY L. 4 O. 4 C. 7.6 D. 0
EATON L. 8 O. 11 C. 11.4 D. 0
INGHAM LANSING L. 4 O. 4 C. 2.8 D. 1.0
LIVINGSTON L. 1 O. 2 C. 1.0 D. 0.3
OAKLAND L. 11 O. 12 C. 20.6 D. 0
MACOMB L. 2 O. 2 C. 0.6 D. 0
LAKE ST CLAIR
SOUTH HAVEN
VAN BUREN L. 10 O. 10 C. 26.5 D. 0
KALAMAZOO L. 8 O. 10 C. 42.8 D. 0
CALHOUN L. 5 O. 5 C. 154.9 D. 0.4
JACKSON L. 5 O. 5 C. 6.9 D. 0
WASHTENAW L. 5 O. 8 C. 8.6 D. 0
WAYNE L. 4 O. 9 C. 5.2 D. 1.4
DETROIT
CANADA
BENTON HARBOR
ST JOSEPH
NEW BUFFALO
BERRIEN L. 10 O. 11 C. 30.7 D. 1.1
CASS L. 4 O. 4 C. 10.9 D. 0
ST JOSEPH L. 6 O. 8 C. 19.5 D. 0
BRANCH L. 10 O. 10 C. 213.6 D. 2.7
HILLSDALE L. 13 O. 14 C. 93.2 D. 0.7
LENAWEE L. 17 O. 19 C. 158.5 D. 0.6
MONROE L. 6 O. 6 C. 19.1 D. 0.3
MONROE
LAKE ERIE
LAKE MICHIGAN
INDIANA
OHIO.

L.=Localities; O.=Outbreaks, C.=Cases per 10,000 population. D.=Deaths per 10,000 population.

[PLATE 785.]

TABLE 2.—*Exhibiting the Estimated Population of Michigan for the year 1893, by tiers of counties (Upper Peninsula as one tier); also the number of cases of Measles* REPORTED *from each of these divisions for 1893, and the number of cases per 10,000 estimated population of each division.*

| Counties in Groups, most Northern ones First. | | Estimated Population, 1893.* | Reported Cases of Measles, 1893. | Reported Cases per 10,000 of Population. |
|---|---|---|---|---|
| State | | 2,204,563 | 7,334 | 33.3 |
| Upper Peninsula | Alger.<br>Delta.<br>Schoolcraft.<br>Luce.<br>Mackinac.<br>Chippewa.<br>Isle Royal.<br>Keweenaw.<br>Houghton.<br>Ontonagon.<br>Gogebic.<br>Baraga.<br>Marquette.<br>Iron.<br>Menominee.<br>Dickinson. | 200,062 | 981 | 49.0 |
| Eleventh tier of counties | Manitou.<br>Emmet.<br>Charlevoix.<br>Cheboygan.<br>Presque Isle. | 40,521 | 315 | 77.7 |
| Tenth tier of counties | Leelanaw.<br>Antrim.<br>Otsego.<br>Montmorency.<br>Alpena. | 45,000 | 5 | 1.1 |
| Ninth tier of counties | Benzie.<br>G'd Traverse.<br>Kalkaska.<br>Crawford.<br>Oscoda.<br>Alcona. | 39,859 | 228 | 56.6 |
| Eighth tier of counties | Manistee.<br>Wexford.<br>Missaukee.<br>Roscommon.<br>Ogemaw.<br>Iosco. | 65,910 | 71 | 10.8 |
| Seventh tier of counties | Mason.<br>Lake.<br>Osceola.<br>Clare.<br>Gladwin.<br>Bay.<br>Huron.<br>Arenac. | 150,592 | 134 | 8.9 |
| Sixth tier of counties | Oceana.<br>Newaygo.<br>Mecosta.<br>Isabella.<br>Midland. | 89,663 | 400 | 44.6 |
| Fifth tier of counties | Muskegon.<br>Montcalm.<br>Gratiot.<br>Saginaw.<br>Tuscola.<br>Sanilac. | 250,006 | 217 | 8.7 |
| Fourth tier of counties | Ottawa.<br>Kent.<br>Ionia.<br>Clinton.<br>Shiawassee.<br>Genesee.<br>Lapeer.<br>St. Clair. | 373,055 | 1,437 | 38.5 |
| Third tier of counties | Allegan.<br>Barry.<br>Eaton.<br>Ingham.<br>Livingston.<br>Oakland.<br>Macomb. | 229,608 | 862 | 37.5 |
| Second tier of counties | Van Buren.<br>Kalamazoo.<br>Calhoun.<br>Jackson.<br>Washtenaw.<br>Wayne. | 491,743 | 547 | 11.1 |
| First tier of counties | Berrien.<br>Cass.<br>St. Joseph.<br>Branch.<br>Hillsdale.<br>Lenawee.<br>Monroe. | 229,022 | 2,142 | 93.5 |

* By Dr. C. L. Wilbur, Chief of Vital Statistics in Michigan, "State Department," Estimate based on the United States census of 1890 and the State census of 1894.—"Vital Statistics," 1893, pp. 17-19. (Computed by arithmetical method, average annual increase.)

From the following thirteen counties: Alger, Antrim, Arenac, Clinton, Crawford, Gladwin, Gratiot, Leelanaw, Luce, Manitou, Ogemaw, Roscommon, and Sanilac,—having an aggregate population of 135,757—no measles was reported during the year.

The proportionate fatality from measles in 1893,—i. e., the proportion of reported cases which proved fatal, was, for the whole State, 1.6 per cent, or about one death to 61.6 cases. The maximum fatality (50 per cent of reported cases) occurred in Livingston county. The minimum fatality (.3 of one per cent of reported cases) occurred in Lenawee county. Other counties where the fatality was considerably *greater* than the average for the State, were: Ingham, 36.3; Wayne, 27.5; Oscoda, 20.; Delta, 17.8; Missaukee, 14.6; Benzie, 14.3, per cent of reported cases. Other counties where the fatality was considerably *less* than the average for the State, were: Allegan, .5; Hillsdale and Houghton, .7; Kent, .9; Branch and Mecosta, 1.; Oceana, 1.2; Cheboygan and Marquette, 1.3, per cent of reported cases.

Although the sickness-rate was higher for this year in Keweenaw county than in any other county in the State, there were no deaths reported from that county.

From 46 of the 71 counties in which measles was reported to have occurred, no deaths from this disease were reported.

The map which follows Table 1, shows for each county of the State the sickness and death-rates per 10,000 of population; the number of localities where the disease was present during the year, and the number of outbreaks which occurred in those localities.

Table 2 exhibits the latitudinal distribution of measles throughout the State, by tiers of counties; all the counties of the upper peninsula considered as one tier. By this table (2), it appears that the greatest sickness-rate (93.5 per 10,000 of population) was in the first tier of counties; and that the eleventh tier with 77.7 cases per 10,000 of population, and the ninth tier with 56.6 cases per 10,000 of population were also largely above the average sickness-rate for the State.

The tier of counties having the lowest sickness-rate (1.1 per 10,000 of population) was the tenth; and the fifth and seventh tiers of counties were next in lowest sickness-rates, they being respectively, 8.7 and 8.9 per 10,000 of population.

The sickness-rate in the fourth tier of counties, as may be seen in the table, was 38.5 cases per 10,000 of population. In the city of Grand Rapids, situated in this tier, the rate was 127.0 per 10,000, and in this tier excluding Grand Rapids, the rate was 16.4 per 10,000 of population.

In the second tier of counties the sickness-rate was 11.1 per 10,000 of population. This rate is *exclusive* of the city of Detroit from which deaths only (37) from measles were reported. If in Detroit the number of cases which occurred were in the same ratio to deaths as were cases to deaths in the whole State (61.6 to 1), there were 2,279 cases in that city or 95.8 cases per 10,000 of population (population of Detroit 237,837, as given in State census for 1894); and the sickness-rate for the whole tier of counties would have been 57.5 per 10,000 of population instead of 11.1 as shown in Table 2.

TABLE 3.—*Exhibiting the numbers of outbreaks, cases and deaths from Measles, the Number of localities in which they occurred, together with the average numbers of cases and deaths per outbreak, and the per cent of cases which proved fatal, reported to the office of the State Board of Health for each of the 4 years, 1890–93; with the departure of the same for 1893, from 1892, and from the average of the same for the 3 years, 1890–93.*

| Year. | Reported Outbreaks. | Reported Localities. | Reported Cases. | Av. No. of Cases per Outbreak. | Reported Deaths. | Av. No. of Deaths per Outbreak. | Deaths per 100 Cases. |
|---|---|---|---|---|---|---|---|
| 1890 | 421 | 407 | * 11,911 | 28.3 | 140 | .33 | 1.2 |
| 1891 | 394 | 379 | * 12,173 | 30.9 | 149 | .38 | 1.2 |
| 1892 | 238 | 229 | * 3,830 | 16.1 | 76 | .32 | 2.0 |
| 1893 | 365 | 326 | * 7,334 | 20.1 | 119 | .33 | 1.6 |
| Average for 3 years, 1890–92 | 351 | 338 | 9,305 | 25.1 | 122 | .34 | 1.5 |
| Departure of 1893 from 1892 | + 27 | + 97 | + 3,504 | + 4.0 | + 43 | + .01 | — .4 |
| Departure of 1893 from the average for 3 years, 1890–92 | + 14 | — 12 | + 1,971 | — 5.0 | — 3 | — .01 | .0 |

* Only the fatal cases were reported from Detroit.

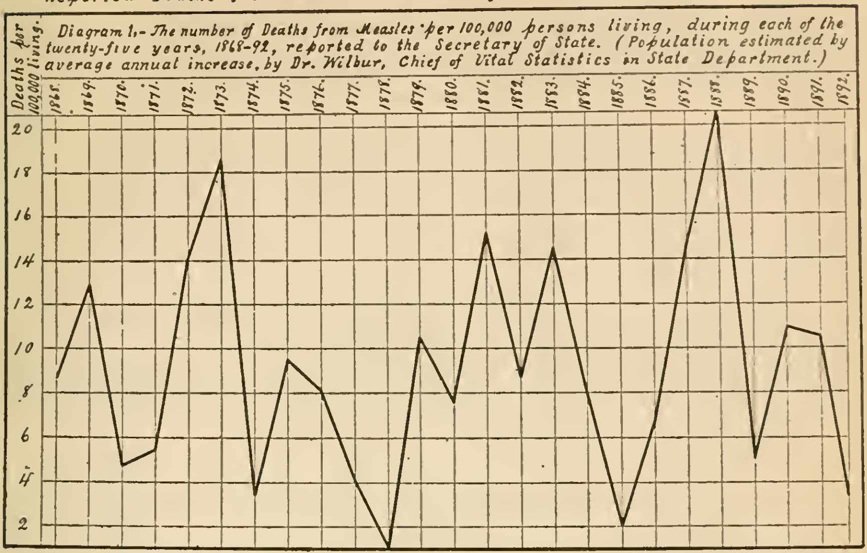
The following table (No. 4), exhibiting the number of deaths from measles, per 100,000 persons living, reported to the Secretary of State, probably more accurately represents the annual fluctuations of, but not the total deaths from measles in Michigan during the 26 years, 1868–93. The diagram (No. 1) printed on page 313 graphically represents the same data, with the exception of those for the year 1893.

TABLE 4.—*Exhibiting the reported number of deaths from measles per 100,000 persons living in Michigan in each of the 26 years, 1868-93. Compiled from the Secretary of State's Vital Statistics of Michigan. (Population estimated by average annual increase, by Dr. Wilbur, Chief of Vital Statistics in State Department.*)*

| Year. | 1868. | 1869. | 1870. | 1871. | 1872. | 1873. | 1874. | 1875. | 1876. | 1877. | 1878. | 1879. | 1880. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deaths (per 100,000, etc.) | 8.66 | 12.88 | 4.72 | 5.45 | 14.12 | 18.56 | 3.37 | 9.50 | 8.10 | 4.13 | 1.03 | 10.49 | 7.63 |
| Year. | 1881. | 1882. | 1883. | 1884. | 1885. | 1886. | 1887. | 1888. | 1889. | 1890. | 1891. | 1892. | 1893. |
| Deaths (per 100,000, etc.) | 15.21 | 8.68 | 14.54 | 7.91 | 2,04 | 6.75 | 14.56 | 20.62 | 5.08 | 10.91 | 10.51 | 3.29 | 5.76 |

* Estimate based on the U. S. census of 1890 and State census of 1894. (Computed by arithmetical method,—average annual increase.)

Reported Deaths from Measles in Michigan, 25 Years, 1868-92.



This Diagram (1) graphically represents Table 1 which supplies the figures in detail.

[Plate 793.]

NUMBER OF OUTBREAKS OF MEASLES IN EACH MONTH OF THE YEAR 1893.

TABLE 5.—*Exhibiting the reported number of outbreaks of Measles which Began, the number which Ended, and the number of outbreaks which were Present, in each Month of the Year 1893, in the different local jurisdictions of Michigan.*

| Outbreaks. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number began | 62 | 40 | 29 | 37 | 36 | 49 | 21 | 8 | 5 | 6 | 8 | 19 | 320 |
| Number ended | 6 | 11 | 26 | 29 | 33 | 26 | 28 | 16 | 11 | 4 | 6 | 16 | 212 |
| Number present | 63 | 96 | 105 | 104 | 97 | 95 | 69 | 39 | 24 | 17 | 20 | 31 | ...... |

The last line of figures, in table 5, representing the reported number of outbreaks present, is not derived from the preceding two lines, as might be supposed, but is obtained by actual count of the number of outbreaks reported as existing in each month. Frequently the beginning of an outbreak is reported but the end of the outbreak is not reported; and sometimes the month in which the outbreak ended is given without giving the date of the beginning of the outbreak. In either case the outbreak may have begun and ended in the same month, or it may have extended through several months. There were 108 more beginnings than endings of outbreaks reported during the year 1893.

TABLE 6.—*Exhibiting the Number and Per Cent of Cases of Measles in Michigan in each Month during the Year 1893. (Includes each case for which, the time during which it existed, was stated in the reports. Each of such cases is counted in each month in which, or part of which, the case was reported to have existed.)*

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of cases present | 602 | 900 | 661 | 490 | 424 | 611 | 408 | 164 | 62 | 43 | 195 | 296 |
| Per cent of cases present | 8. | 12. | 9. | 6. | 5. | 8. | 5. | 2. | .8 | .6 | 2. | 4. |

The first line of figures, in table 6, exhibits the number of cases reported sick in each month or any part of the month.

The last line of figures, in this table, exhibits the per cent the cases sick in each month are of the whole number of cases reported to this office for the year 1893.

## SOURCE OF CONTAGIUM OF CASES OF MEASLES.

Of the 7,334 cases of measles reported to this office, as having occurred in the year 1893, the local health officials reported relative to the source of contagium in ways which may be summarized as follows:—Traced to a former case, 1,357; probably traced to a former case, 285; unknown, 3,622; not stated, 1,949; as coming from outside of jurisdiction, 121.

TABLE 7.—*Reported source of Contagium of cases of Measles in Michigan during the year 1893.*

| Source. | Numbers of cases. |
|---|---|
| Traced to a former case | 1,357 |
| Probably traced to a former case | 285 |
| Unknown (includes reported "epidemic," "exposure," "sporadic") | 3,622 |
| Not stated | 1,949 |
| Reported as coming from outside of jurisdiction | 121 |
| All cases | 7,334 |

TABLE 8.—*First, second and third Localities, where the second Locality was infected with Measles from the first, and the third was infected from the second; and the numbers of Cases and Deaths from Measles in the first, second and third Localities, with the date of the beginning and ending of each outbreak. (Compiled from reports of health officers who were able to trace the source of contagium to other localities.)*

| Number.† | First Localities from which Measles spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 1 | Alcona county:<br>Greenbush township | * | ---- | Alcona county:<br>Haynes township<br>(June 26 ——.) | 14 | 0 | | | |
| 2 | Allegan county:<br>Douglas village<br>(Jan.-Apr. 20.) | 9 | 0 | Allegan county:<br>Fennville village<br>Jan.-Apr. 1.) | 16 | 0 | | | |
| | | | | Ganges township | 97 | 0 | | | |
| 3 | Allegan county:<br>Otsego village<br>(Jan. 3-June.) | 91 | 3 | Allegan county:<br>Casco township<br>(Mar. 24-Apr. 15.) | 19 | 0 | | | |
| 4 | Barry county:<br>Hope township | * | ---- | Barry county:<br>Barry township<br>(July 13-Oct. 5.) | 7 | 0 | | | |
| 5 | Branch county:<br>Coldwater city<br>(Jan. 3-May 9.) | 350 | 1 | Branch county:<br>Bethel township<br>(Mar. 20 ——.) | 45 | 0 | | | |
| | | | | Ovid township<br>(Feb.-Apr.) | 50 | 1 | | | |
| | | | | Union City village<br>(Feb. 27 ——.) | 33 | 2 | St. Joseph county:<br>Mendon village<br>(June 1-July 10.) | 4 | 0 |
| 6 | Calhoun county:<br>Battle Creek city<br>(Jan. 9.-Nov.) | 48 | 0 | Calhoun county:<br>Athens township<br>(July 20-Aug. 10.) | 5 | 0 | | | |
| | | | | Eaton county:<br>Charlotte city<br>(June-Aug.) | 8 | 0 | | | |
| 7 | Cass county:<br>Vandalia village<br>(Mar. 20-May 18.) | 3 | 0 | Cass county:<br>Penn township<br>(Apr. 26-May 10.) | 2 | 0 | | | |
| 8 | Charlevoix county:<br>Bay township | 10 | 0 | Emmet county:<br>Petoskey village<br>(Jan. 13-Jan. 20.) | 1 | 0 | | | |
| 9 | Charlevoix county:<br>Chandler township | * | ---- | Otsego county:<br>Corwith township<br>(Nov. 22-Dec. 4.) | 1 | 0 | | | |
| 10 | Charlevoix county:<br>Eveline township | * | ---- | Charlevoix county:<br>Wilson township<br>(May 10-May 20.) | 2 | 0 | | | |

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† The consecutive numbers in this column refer to similar consecutive numbers before the quotations in the text following this table.

* Measles was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the locality from which the disease is reported to have spread.

TABLE 8.—Continued.—*Movements of Contagium or Infection.*

| Number.† | First Localities from which Measles spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 11 | Cheboygan county: Cheboygan city (Jan.-Aug.) | 150 | 2 | Cheboygan county: Mackinaw city village (Feb. 28 ——.) | 1 | 0 | | | |
| | | | | Chippewa county: Detour township (June 22 ——.) | 8 | 0 | | | |
| | | | | Mackinac county: Mackinac Island (June 10-July 30.) | 2 | 0 | | | |
| | | | | Presque Isle county: Case township (May ——.) | 20 | 0 | | | |
| 12 | Dickinson county: Iron Mountain city (Jan.-Dec.) | 50 | 0 | Dickinson county: Sagola township (Dec. 20-Jan. 21, '94.) | 2 | 0 | | | |
| 13 | Eaton county: Eaton Rapids City | 12 | 0 | Eaton county: Charlotte city (May ——.) | 1 | 0 | | | |
| 14 | Eaton county: Sunfield township | * | ---- | Van Buren county: Hartford township (Feb. 5 ——.) | 11 | 0 | | | |
| 15 | From southern part of State | ---- | ---- | Charlevoix county: Boyne City village (Jan. 4-June 24.) | 4 | 0 | Charlevoix county: Hayes township ‡ (Mar. 10-June 15.) | 75 | 0 |
| | | | | | | | Wilson township (Feb. 1-Mar. 20.) | 2 | 0 |
| | | | | | | | Cheboygan county: Mackinaw City vil. (May 28-June 6.) | 2 | 0 |
| | | | | | | | Emmet county: Petoskey village (Apr. 8-Apr. 22.) | 8 | 0 |
| 16 | Gladwin county: Gladwin city | * | ---- | Saginaw county: Thomastown twp. (Nov. 20-Dec. 26.) | 26 | 0 | | | |
| 17 | Gratiot county | ---- | ---- | Wexford county: Harriette village (Feb.-Mar.) | 8 | 0 | | | |
| 18 | Hillsdale county: Hillsdale city (Feb. 2-May 30.) | 10 | 0 | Hillsdale county: Adams township (Mar. 8-May 8.) | 10 | 0 | | | |
| | | | | Allen township (May 6-May 25.) | 2 | 0 | | | |
| | | | | Jefferson township (June 5 ——.) | 1 | 0 | | | |
| 19 | Hillsdale county: Jonesville village (Jan. 21-June 1.) | 159 | 0 | Hillsdale county: Litchfield township (Feb. 5-June 5.) | 16 | 1 | | | |
| 20 | Ionia county: Campbell township (Jan. 13-Jan. 18.) | 1 | 0 | Ionia county: Ionia city (Feb.-Mar. 4.) | 1 | 0 | | | |
| 21 | Jackson county: Grass Lake village | * | ---- | Washtenaw county: Chelsea village (June 10-June.) | 1 | 0 | | | |

† The consecutive numbers in this column refer to similar consecutive numbers before the quotations in the text following this table.

* Measles was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the locality from which the disease is reported to have spread.

‡ From Hayes township to a fourth locality, Charlevoix village, Charlevoix county, 6 cases.

TABLE 8.—CONTINUED.—*Movements of Contagium or Infection.*

| Number.† | First Localities from which Measles spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 22 | Jackson county:<br>Jackson city<br>(Jan. 21-Aug. 22.) | 15 | 0 | Washtenaw county:<br>Chelsea village<br>(June-July.) | 1 | 0 | | | |
| 23 | Kalamazoo county | * | ---- | Barry county:<br>Nashville village<br>(Jan. 15-Jan. 21.) | 1 | 0 | | | |
| 24 | Kent county:<br>Grand Rapids city<br>(Jan. 7-Dec. 30.) | 948 | 9 | Allegan county:<br>Leighton township<br>(July 4-July 12.) | 1 | 0 | | | |
| | | | | Wayland township | 3 | 0 | | | |
| | | | | Kent county:<br>Bowne township<br>(Dec. 29-Jan. 10, '94.) | 1 | 0 | | | |
| | | | | Paris township<br>Sept. 7-Sept. 25.) | 6 | 0 | | | |
| | | | | Walker township<br>Dec. 7-Dec. 25.) | 1 | 0 | Newaygo county:<br>Beaver township | 2 | 0 |
| 25 | Kent county:<br>Grattan township | * | ---- | Kent county:<br>Lowell village<br>(June 1-June 10.) | 1 | 0 | | | |
| 26 | Keweenaw county:<br>Eagle Harbor towns'p. | 75 | 0 | Keweenaw county:<br>Sherman township<br>(Nov.-Nov.) | 4 | 0 | | | |
| 27 | Lapeer county:<br>Dryden village<br>(Feb. ——.) | 15 | 0 | Lapeer county:<br>Almont township | 2 | 0 | | | |
| | | | | Imlay township<br>Apr. ——.) | 1 | 0 | | | |
| 28 | Lapeer county:<br>Lapeer city | * | ---- | Houghton county:<br>Houghton village<br>(Aug. 25-Sept. 1.) | 1 | 0 | | | |
| 29 | Lenawee county:<br>Adrian city | 405 | 2 | Lenawee county:<br>Dover township<br>(Jan. 1-June 12.) | 24 | 0 | | | |
| | | | | Fairfield township<br>(Apr. 10-May 15.) | 11 | 1 | | | |
| | | | | Morenci village<br>(Jan. 28-June 26.) | 12 | 0 | | | |
| | | | | Ogden township<br>(Jan. 14-Feb. 10.) | 2 | 0 | | | |
| | | | | Rome township<br>(Feb. 24-Apr. 8.) | 7 | 0 | | | |
| 30 | Mecosta county:<br>Big Rapids city<br>(Jan. 28-Mar.) | 44 | 1 | Mecosta county:<br>Colfax township<br>(June-July.) | 32 | 1 | | | |
| 31 | Mecosta county:<br>Martiny township | * | ---- | Mecosta county:<br>Hinton township<br>(June-July.) | 19 | 0 | | | |
| 32 | Midland county:<br>Midland city | * | ---- | Saginaw county:<br>Tittabawassee twp.<br>(Mar. 14-May.) | 7 | 0 | | | |
| 33 | Montcalm county:<br>Bushnell township<br>(Jan. 7-July 27.) | ---- | ---- | Montcalm county:<br>Evergreen township<br>(May ——.) | 7 | 0 | | | |

† The consecutive numbers in this column refer to similar consecutive numbers before the quotations in the text following this table.

* Measles was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the lacality from which the disease is reported to have spread.

TABLE 8.—CONTINUED.—*Movements of Contagium or Infection.*

| Number.† | First Localities from which Measles spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 34 | Newaygo county:<br>Hesperia village<br>(June-June.) | 1 | 0 | Newaygo county:<br>Troy township<br>(July 16-Aug. 30.) | 11 | 1 | | | |
| 35 | Newaygo county | * | ---- | Oceana county:<br>Colfax township<br>(June 5 ——.) | 1 | 0 | | | |
| 36 | Oakland county:<br>Birmingham village | * | ---- | Shiawassee county:<br>Owosso city<br>(Dec. 3-Dec.) | 1 | 0 | | | |
| 37 | Oceana county:<br>Pentwater village | * | ---- | Oceana county:<br>Golden township<br>(Oct. 14 ——.) | 4 | 0 | | | |
| 38 | Ottawa county:<br>Holland city | * | ---- | Allegan county:<br>Heath township<br>(Mar. 10-May 1.) | 2 | 0 | | | |
| | | | | Kalamazoo county:<br>Kalamazoo city<br>(Apr. 5-May 23.) | 107 | 0 | St. Joseph county:<br>Leonidas township<br>(May 22.) | 1 | 0 |
| 39 | St. Clair county:<br>Port Huron city<br>(May ——.) | 13 | 0 | St. Clair county:<br>Kimball township<br>(May-June 6.) | 2 | 0 | | | |
| 40 | Schoolcraft county:<br>Hiawatha township<br>(Jan. 10-Mar.) | 7 | 0 | Schoolcraft county:<br>Harrison township<br>(Jan. 27-Apr.) | 11 | 0 | | | |
| | | | | Manistique village<br>(Feb. 1-Apr.) | 13 | 0 | Chippewa county:<br>Whitefish township<br>(May-July 25.) | 18 | 0 |
| 41 | Tuscola county:<br>Caro village<br>(May 20-June.) | 4 | 0 | Tuscola county:<br>Kingston township<br>(May 15——.) | 2 | 0 | | | |
| 42 | Van Buren county:<br>Paw Paw village<br>(Jan. 14-Feb. 20.) | 8 | 0 | Van Buren county:<br>Waverly township<br>(Mar.——.) | 6 | 0 | | | |
| 43 | Washtenaw county:<br>Lima township<br>(June-July.) | 3 | 0 | Washtenaw county:<br>Chelsea village<br>(June 18-July 5.) | 5 | 0 | | | |
| 44 | Wayne county:<br>Detroit city<br>(Jan.-Dec.) | 87 | 37 | Iron county:<br>Crystal Falls village<br>(Apr. 3-Apr. 25.) | 3 | 0 | | | |
| | | | | Macomb county:<br>Ray township<br>(May 28-June 3.) | 1 | 0 | | | |
| | | | | Monroe county:<br>Ida township<br>(Mar. ——.) | 2 | 0 | | | |
| | | | | Oakland county:<br>Waterford township<br>(June 23-July 1.) | 1 | 0 | | | |
| | | | | Washtenaw county:<br>Chelsea village<br>(June-July.) | 3 | 0 | | | |
| | | | | Wayne county:<br>Nankin township<br>(Feb. 25-May.) | 18 | 0 | | | |
| | | | | Wayne village<br>(Apr. ——.) | 2 | 0 | | | |
| 45 | Wexford county:<br>Liberty township | * | ---- | Wexford county:<br>Manton village<br>(Jan. 20-Feb. 25.) | 8 | 0 | | | |

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† The consecutive numbers in this column refer to similar consecutive numbers before the quotations in the text following this table.

* Measles was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the locality from which the disease is reported to have spread.

TABLE 8.—CONTINUED.—*Movements of Contagium or Infection* Into Michigan *from outside the State.*

| Number.† | First Localities from which Measles spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 46 | Canada | ---- | ---- | Ontonagon county:<br>Interior township<br>(May 1 —.) | 1 | 0 | | | |
| 47 | Chicago | ---- | ---- | Allegan county:<br>Cheshire township<br>(Jan.-May.) | 100 | 0 | | | |
| | | | | Berrien county:<br>Benton Harbor city<br>(Jan. 2-June 10.) | 108 | 1 | Berrien county:<br>St. Joseph village<br>(April —.) | 1 | 0 |
| | | | | Buchanan village<br>(Feb. 15-Mar.) | 1 | 0 | Van Buren county:<br>Keeler township<br>(Mar. 1-April 11.) | 6 | 0 |
| | | | | Berrien county:<br>Watervleit village<br>(Dec. 27, '92-Feb. 28.) | 22 | 0 | Berrien county:<br>Watervliet township<br>(May 12-June 8.) | 8 | 0 |
| | | | | Cass county:<br>Marcellus township<br>(April 15-May 12.) | 8 | 0 | | | |
| | | | | Delta county:<br>Escanaba city<br>(Dec., 1892-1893.) | 1 | 0 | | | |
| | | | | Eaton county:<br>Potterville village<br>(June 10-July 16.) | 5 | 0 | | | |
| | | | | Kalkaska county:<br>Boardman township<br>(Jan. 1-April 11.) | 71 | 0 | Gd. Traverse county:<br>Fife Lake village‡<br>(Feb. 1-May 31.) | 60 | 0 |
| | | | | Muskegon county:<br>Muskegon city<br>(June-Aug.) | 4 | 0 | | | |
| | | | | Tuscola county:<br>Columbia township<br>(April 2-May 16.) | 3 | 0 | | | |
| 48 | Dakota | ---- | ---- | Eaton county:<br>Charlotte city<br>(May 11-May 20.) | 1 | 0 | | | |
| | | | | Saginaw county:<br>Chapin township | 1 | 1 | | | |
| 49 | Europe:<br>Holland | ---- | ---- | Missaukee county:<br>Richland township<br>(May —.) | 2 | 0 | | | |
| | | | | Riverside township<br>(June —.) | 1 | 1 | | | |
| 50 | Indiana:<br>South Bend | ---- | ---- | Berrien county:<br>Niles city<br>(Dec. 13-Dec. 15.) | 1 | 0 | | | |

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† The consecutive numbers in this column refer to similar consecutive numbers before the quotations in the text following this table.

‡ From Fife Lake village to Fife Lake township 1 case, and to Kalkaska county, Springfield township, cases.

TABLE 8.—CONTINUED.—*Movements of Contagium or Infection* Into Michigan *from outside the State.*

| Number.† | First Localities from which Measles spread. | | | Second Localities Infected from First. | | | Third Localities Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 51 | Indiana | ---- | ---- | Clare county:<br>Farwell village<br>(May 7-May 12.) | 1 | 0 | | | |
| | | | | Ionia county:<br>Campbell township<br>(June 8-Aug. 8.) | 4 | 0 | | | |
| | | | | Oceana county:<br>Golden township<br>(April 6-May 30.) | 30 | 0 | | | |
| | | | | St. Joseph county:<br>Leonidas township<br>(April-June.) | 8 | 0 | | | |
| | | | | St. Joseph county:<br>Sturgis village<br>(June-Nov. 16.) | 12 | 0 | | | |
| 52 | Kansas | ---- | ---- | Hillsdale county:<br>Camden township<br>(Feb. 20-May 15.) | 25 | 1 | | | |
| 53 | Minnesota:<br>Duluth | ---- | ---- | Montmorency county:<br>Montmorency twp<br>(Dec. 1 ——.) | 2 | 0 | | | |
| 54 | Minnesota: | | | Muskegon county:<br>Muskegon city<br>(Oct. 24-Nov. 8.) | 1 | 0 | | | |
| 55 | New York State | ---- | ---- | Alcona county:<br>Harrisville township<br>(June 14-July 30.) | 20 | 0 | | | |
| 56 | Ohio | ---- | ---- | Allegan county:<br>Salem township<br>(April 22-June 25.) | 84 | 1 | | | |
| 57 | Ohio:<br>Toledo | ---- | ---- | Huron county:<br>Port Austin village<br>(July 10-July. 22.) | 2 | 0 | | | |
| | | | | Newaygo county:<br>Hesperia village<br>(Jan. 20 ——.) | 2 | 0 | | | |
| 58 | On shipboard | ---- | ---- | Missaukee county:<br>McBain village<br>(June ——.) | 1 | 1 | | | |
| 59 | Oregon | ---- | ---- | Gd. Traverse county:<br>Paradise township<br>(Jan. 2-Mar.) | 20 | 0 | | | |
| 60 | Wisconsin:<br>Ellis Junction | ---- | ---- | Menominee county:<br>Menominee city<br>(May 4-Sept. 18.) | 5 | 0 | | | |
| 61 | Wisconsin:<br>Milwaukee | ---- | ---- | Muskegon county:<br>Muskegon city<br>(Aug. 2-Aug. 16.) | 1 | 0 | | | |

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† The consecutive numbers in this column refer to similar consecutive numbers before the quotations in the text following this table.

TABLE 8.—CONTINUED.—Probable *Movement of Contagium or Infection.*

| Number.† | First Localities from which Measles probably spread. | | | Second Localities probably Infected from First. | | | Third Localities probably Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 62 | Allegan county:<br>Douglas village<br>(Jan.-April 20.) | 9 | 0 | Allegan county:<br>Saugatuck village<br>(Jan. 1-Mar. 3.) | 79 | 0 | Allegan county:<br>Saugatuck township<br>(Jan. 2-Mar. 28.) | 10 | 0 |
| 63 | Bay county:<br>Bay City | * | --- | Bay county:<br>Fraser township<br>(Jan. 1-Feb. 7.) | 88 | 2 | | | |
| 64 | Berrien county:<br>Benton Harbor city<br>(Jan. 2-June 10.) | 108 | 1 | Cass county:<br>Vandalia village<br>(Mar. 20-May 13.) | 3 | 0 | | | |
| 65 | Genesee county:<br>Flint city | * | --- | Lapeer county:<br>Almont township<br>(Mar. 1 ——.) | 148 | 0 | | | |
| 66 | Kent county:<br>Grand Rapids city | 948 | 9 | Barry county:<br>Hasting city<br>(June 10-July 1.) | 2 | 0 | | | |
| | | | | Kent county:<br>Paris township<br>(July 10-July 20.) | 5 | 0 | | | |
| 67 | Saginaw county:<br>Saginaw city<br>(June-Dec.) | 110 | 0 | Tuscola county:<br>Vassar village | 3 | 0 | | | |

TABLE 8.—CONCLUDED.—Probable *Movement of Contagium or Infection* Into Michigan *from outside the State.*

| Number.† | First Localities from which Measles probably spread. | | | Second Localities probably Infected from First. | | | Third Localities probably Infected from Second. | | |
|---|---|---|---|---|---|---|---|---|---|
| | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. | Locality. | Cases. | Deaths. |
| 68 | Chicago | ---- | -- | Hillsdale county:<br>Ransom township<br>(Jan. 5-April.) | 10 | 0 | | | |
| | | | | Mackinac county:<br>Newton township<br>(June 7 ——.) | 25 | 0 | | | |
| | | | | Mackinac Island<br>(May 25-June 20.) | 2 | 0 | | | |
| | | | | Oakland county:<br>Groveland township<br>(Feb. 21-Mar. 11.) | 1 | 0 | | | |
| 69 | Indiana | --- | ---- | Kalamazoo county:<br>Kalamazoo city<br>(Jan. 15-Jan. 28.) | 1 | 0 | | | |

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† The consecutive numbers in this column refer to similar consecutive numbers before the quotations in the text following this table.

* Measles was not reported to this office by the health officer of the "first" locality at the time it was said to have spread from there. This may indicate neglect in the locality from which the disease is reported to have spread.

## *Cases of Measles Traced to a Former Case.*

The following are representative statements taken from health officers' reports in which cases of measles are traced to a previous case of the disease, usually in the same jurisdiction:

"By infection from neighboring jurisdictions." *G. Wilson Forrest, M. D., Manlius township, Allegan county.*

"Previous cases." *F. W. French, M. D., Otsego township, Allegan county.*

"By immigrants coming in." *W. E. Bailey, Benzonia township, Benzie county.*

"From previous cases unreported." *Talma Hendrick, Hagar township, Berrien county.*

"A young man returned home from infected district bringing the measles." *John I. Baker, M. D., Le Roy township, Calhoun county.*

"Brought here from another town." *J. Gould, M. D., Fenton village, Genesee county.*

"Was exposed to infected persons." *E. B. Sabin, M. D., Wheatland township, Hillsdale county.*

"Contracted by one W—— W—— while in transit between Big Rapids and Kalamazoo." *Geo. W. Nease, Cooper township, Kalamazoo county.*

"Exposed on a train coming from Toledo, Ohio." *Geo. W. Nease, Cooper township, Kalamazoo county.*

"The disease was brought to our township by a stranger." *John S. Caulkins, M. D., Dryden township, Lapeer county.*

"From her sister." *F. E. Wolfe, M. D.. Metamora township, Lapeer county.*

"From another township; his wife having had it there." *S. B. Rolison, M. D., Denver township, Newaygo county.*

"Taken from a young man in the store." *Egbert E. Bird, Mt. Pindus township, Oscoda county.*

"Previous cases." *R. F. Johnson, clerk, Saginaw city, E. S., Saginaw county.*

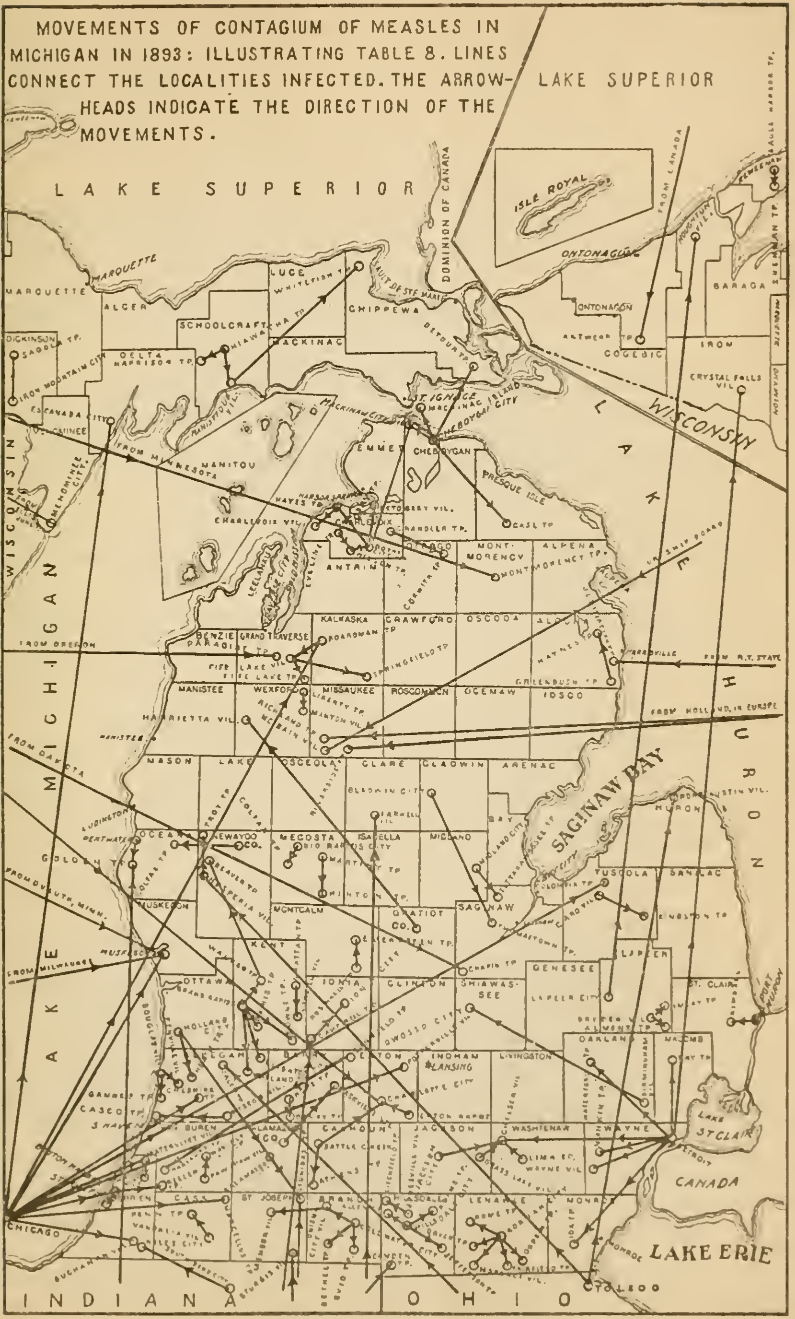
"Direct exposure." *Geo. C. Hafford, M. D., Hiawatha township, Schoolcraft county.*

"All being exposed to infected persons." *S. W. Barkwell, M. D., Dearborn township, Wayne county.*

### MOVEMENTS OF MEASLES CONTAGIUM IN MICHIGAN IN 1893.

On the accompanying map, the spread of measles in Michigan as reported to this office in the year 1893, is shown by black lines which connect the localities; the arrow-head indicates the direction of the movement in each case. The source of this information is given in the list of "extracts of reports of health officers" (beginning on page 324 and ending on page 327), with the name and address of each health officer who traced the source of contagium in his jurisdiction to some outside jurisdiction. Tabular statements relating to these instances are in Table 8, pages 315-321. Consecutive numbers in the first column of Table 8, preceding each "First Locality" from which diphtheria spread refer to corresponding consecutive numbers preceding paragraphs in the "extracts from reports of health officers" on pages 324–327.

# MOVEMENTS OF CONTAGIUM OF MEASLES IN 1893.



MOVEMENTS OF CONTAGIUM OF MEASLES IN MICHIGAN IN 1893: ILLUSTRATING TABLE 8. LINES CONNECT THE LOCALITIES INFECTED. THE ARROW-HEADS INDICATE THE DIRECTION OF THE MOVEMENTS.

[PLATE 778.]

## *Outbreaks Traced to a Former Case.*

The following are extracts from reports of health officers who were able to trace the outbreaks of measles in their respective jurisdictions to cases of the disease outside their jurisdictions,—with the name of the health officer, and of the jurisdiction, subjoined. These quotations concerning the spread of contagium from first to second, from second to third, and even to fourth localities, are arranged in the same order as the "First Localities" in Table 8, thus giving the source of each report:

1. "From the County Farm."—*Robert Dobson, Haynes township, Alcona county.*

2. "From contagion at Douglas.—*Wm. H. Andrews, M. D., Fennville village, Allegan county.*

2. "It came from Douglas by some of the young people attending the Douglas high school where the epidemic broke out."—*E. E. Brunson, M. D., Ganges township, Allegan county.*

3. "From Otsego."—*E. Guy Lyman, clerk, Casco township, Allegan county.*

4. "From Cedar Creek." [Hope township, Barry county]."—*Chas. A. Scribner, M. D.. Barry township Barry county.*

5. "At Coldwater."—*R. T. Martin, M. D., Bethel township, Branch county.*

5. "At school in Coldwater."—*Edwin R. Bates, clerk, Ovid township, Branch county.*

5. "Case from Coldwater, Mich., while on a visit to this place came down with the disease."—*E. H. Hurd, M. D., Union City village, Branch county.*

5. "By a teamster from Union City."—*Edwin Stewart, M. D., Mendon village, St. Joseph county.*

6. "From Battle Creek."—*F. M. Wright, M. D., Athens township, Calhoun county.*

6. "From Battle Creek."—*G. B. Allen, M. D., Charlotte city, Eaton county.*

7. "From village of Vandalia."—*John M. Wright, M. D., Penn township, Cass county.*

8. "Case brought into Petoskey from Bay township, Charlevoix county."—*A. G. Oven, M. D., Petoskey village, Emmet county.*

9. "Chandler."—*Selah Heath, Corwith township, Otsego county.*

10. "At Advance visiting [Eveline township, Charlevoix county]."—*John W. Isaman, Wilson township, Charlevoix county.*

11. "Exposed while in the city of Cheboygan."—*John J. Reycroft, M. D., Mackinaw City village, Cheboygan county.*

11. "Cheboygan, Mich."—*L. E. Shepherd, M. D., Detour township, Chippewa county.*

11. "Came from Cheboygan."—*James H. Bogan, M. D., Mackinac Island, Mackinac county.*

11. "From Cheboygan."—*John Caldwell, Case township, Presque Isle county.*

12. "Contracted in Iron Mountain city."—*M. F. Dockery, M. D., Sagola township, Dickinson county.*

13. "One case came from Eaton Rapids."—*G. B. Allen, M. D., Charlotte city, Eaton county.*

14. "Exposed at Sunfield, Eaton county."—*H. C. Maynard, M. D., Hartford township, Van Buren county.*

15. "From the southern part of the State."—*Alfred J. Delacy, M. D., Boyne City village, Charlevoix county.*

15. "Contracted at teachers' examination at Boyne City, Mich., one of the applicants being present with the disease."—*Abel W. Chew, Hayes township, Charlevoix county.*

15. "From the township of Hayes."—*H. S. Harsha, clerk, Charlevoix village, Charlevoix county.*

15. "At Boyne City at school."—*John W. Isaman, Wilson township, Charlevoix county.*

15. "At Boyne City village."—*John J. Reycraft, M. D., Mackinaw City village, Cheboygan county.*

15. "From Boyne City [village]."—*A. G. Oven, M. D., Petoskey village, Emmet county.*

16. "A boy went to Gladwin on a visit, taken sick while going to school after his return, and all the school had it, that had not had it before."—*Henry A. Armstrong, Thomastown township, Saginaw county.*

17. "Gratiot county."—*Thomas H. Jackson, acting health officer, Harriette village, Wexford county.*

18. "In Hillsdale city."—*Franklin Noyes, M. D., Adams township, Hillsdale county.*

18. "Was from Hillsdale. The mother of the children going to take care of another family sick with the measles."—*Henry W. Whitmore, M. D., Allen township, Hillsdale county.*

18. "From Hillsdale."—*James Cousins, President of Board of Health, Jefferson township, Hillsdale county.*

19. "Party went to Jonesville where it prevailed."—*L. A. Howard, M. D., Litchfield township, Hillsdale county.*

20. "From Clarksville [Campbell township]."—*James G. Conner, M. D., Ionia city, Ionia county.*

21. "Grass Lake."—*G. W. Palmer, M. D., Chelsea village, Washtenaw county.*

22. "Jackson."—*G. W. Palmer, M. D., Chelsea village, Washtenaw county.*

23. "Patient contracted the disease while in Kalamazoo county."—*R. P. Comfort, M. D., Nashville village, Barry county.*

24. "Person from Grand Rapids."—*Vassal P. Fales, Leighton township, Allegan county.*

24. "Visitors from Grand Rapids."—*C. W. Andrews, M. D., Wayland township, Allegan county.*

24. "Brought from Grand Rapids."—*J. E. Hunter, M. D., Bowne township, Kent county.*

24. "From Grand Rapids."—*J. A. Stoddard, Paris township, Kent county.*

24. "From Grand Rapids."—*S. J. Stewart, Walker township, Kent county.*

24. "Walkerville" [Walker township].—*Benj. Candee, Beaver township, Newaygo county.*

25. "Exposure in the adjoining town of Grattan."—*Otto C. McDonnell, M. D., Lowell village, Kent county.*

26. "Eagle Harbor township."—*Jno. Mac Rae, M. D., Sherman township, Keweenaw county.*

27. "A girl came here from Dryden exposing one girl here."—*H. H. Mair, clerk, Almont township, Lapeer county.*

27. "Contracted the disease at the village of Dryden, Lapeer county, where the disease was prevailing."—*Geo. W. Jones, M. D., Imlay township, Lapeer county.*

28. "From Lapeer, Mich."—*H. W. Jones, M. D., Houghton village, Houghton county.*

29. "The mother took them in Adrian at Circuit Court and gave them to her children."—*E. Bates, Dover township, Lenawee county.*

29. "Patients exposed in Adrian."—*Mark A. Jerome, M. D., Fairfield township, Lenawee county.*

29. "Came from Adrian."—*Samuel Stevenson, M. D., Morenci village, Lenawee county.*

29. "Patient contracted the disease at Adrian."—*A. O. Wotring, M. D., Ogden township, Lenawee county.*

29. "Contracted at a teachers' examination held at Adrian."—*E. J. Ross, M. D., Rome township, Lenawee county.*

30. "Brought in from the city of Big Rapids."—*Geo. Miller, Colfax township, Mecosta county.*

31. "From town of Martiny."—*N. W. Adams, Hinton township, Mecosta county.*

32. "Midland."—*Wm. H. Metcalf, Tittabawassee township, Saginaw county.*

33. "Three of these taken sick were exposed to infected persons while working in a saw mill in the township of Bushnell, and the other cases were taken from these."—*Andrew J. Greenhoe, Evergreen township, Montcalm county.*

34. "From Hesperia."—*Charles Freeman, clerk, Troy township, Newaygo county.*

35. "Brought from Newaygo county."—*A. J. Cole, Colfax township, Oceana county.*

36. "Birmingham."—*C. A. Osborn, M. D., Owosso city, Shiawassee county.*

37. "Pentwater."—*E. I. Allen, M. D., Golden township, Oceana county.*

38. "Was brought from school at Holland, Ottawa county."—*Kinsey Martin, Heath township, Allegan county.*

38. "From Holland, Mich."—*C. Van Zwaluwenburg, M. D., Kalamazoo city, Kalamazoo county.*

38. "Contracted while in Kalemazoo, Mich."—*W. C. Hontz, M. D., Leonidas township, St. Joseph county.*

39. "Persons at Port Huron."—*Geo. C. Brock, M. D., Kimball township, St. Clair county.*

40. "From Hiawatha."—*A. C. Hubbell, M. D., Harrison township, Schoolcraft county.*

40. "Hiawatha township."—*A. E. Burdick, M. D., Manistique village, Schoolcraft county.*

40. "Manistique."—*Wm. Hawkins, Whitefish township, Chippewa county.*

41. "By visiting at Caro."—*Geo. Bates, M. D., Kingston township, Tuscola county.*

42. "Disease contracted in Paw Paw village."—*E. A. Chase, Waverly township, Van Buren county.*

43. "From Lima township."—*G. W. Palmer, M. D., Chelsea village, Washtenaw county.*

44. "Exposed in Detroit."—*C. C. Moffett, M. D., Crystal Falls village, Iron county.*

44. "It was taken while in Detroit. His wife was sick there under treatment and he went to take her home."—*Geo. B. Court, Ray township, Macomb county.*

44. "Imported from Detroit."—*C. C. Iffland, M. D., Ida township, Monroe county.*

44. "Detroit."—*Ellsworth Orton, M. D., Waterford township, Oakland county.*

44. "Detroit."—*G. W. Palmer, M. D., Chelsea village, Washtenaw county.*

44. "The children came out here from Detroit after they had been exposed to the disease."—*H. E. Foster, M. D., Nankin township, Wayne county.*

44. "Detroit, no doubt."—*H. E. Foster, M. D., Wayne village, Wayne county.*

45. "Lumber camps located in the township of Liberty."—*E. Morgan, M. D., Manton village, Wexford county.*

*Movement of Infection from Outside the State.*

46. "Canadian immigrant."—*Robert H. Sturgeon, M. D., Interior township, Ontonagon county.*

47. "School inoculated by a young man from Chicago."—*S. S. Stout, M. D., Cheshire township, Allegan county.*

47. "Chicago."—*W. Ryno, M. D., Benton Harbor city, Berrien county.*

47.* "Benton Harbor."—*John W. Doyle, M. D., St. Joseph city, Berrien county.*

47.* "First case was exposed while at school in Benton Harbor."—*W. A. Mumbree, M. D., Keeler township, Van Buren county.*

47. "From Chicago."—*M. M. Knight, M. D., Buchanan village, Berrien county.*

47. "From Chicago."—*W. L. Garratt, M. D., Watervliet village, Berrien county.*

47.* "From the village of Watervliet."—*W. L. Garratt, M. D., Watervliet township, Berrien county.*

47. "A young doctor contracted measles in Chicago and came home exposing his brother and sisters and three children of a neighbor."—*Fred Shillito, M. D., Marcellus township, Cass county.*

47. "Don't know. One case came from Chicago, but we had the disease before he came."—*Otis E. Youngquist, M. D., Escanaba city, Delta county.*

47. "Chicago."—*E. R. Espie, M. D., Potterville village, Eaton county.*

47. "Brought from Chicago."—*S. Emmet Neihardt, M. D., Boardman township, Kalkaska county.*

47.* "By a school teacher coming into this jurisdiction from Boardman township when coming down with the disease."—*L. S. Walter, M. D., Fife Lake village, Grand Traverse county.*

47.* "At Fife Lake village."—*L. S. Walter, M. D., Fife Lake township, Grand Traverse county.*

47. "It was brought from Fife Lake to our township."—*Wilson H. Gill, Springfield township, Kalkaska county.*

47. "In Chicago."—*Geo. L. Le Fevre, M. D., Muskegon city, Muskegon county.*

47. "Mrs. W—— was exposed to the disease in Chicago. Five days after coming home she came down with measles."—*J. Wood, Columbia township, Tuscola county.*

48. "A child visiting from Dakota."—*G. B. Allen, M. D., Charlotte city, Eaton county.*

48. "Brought from Dakota."—*A. M. Brown, Chapin township, Saginaw county.*

49. "Immigrants just from Holland, Europe."—*Weller H. Taylor, Richland township, Missaukee county.*

49. "By a family of immigrants from Holland, Europe."—*Alex. McBain, Sr., Riverside township, Missaukee county.*

50. "Exposed in South Bend, Indiana."—*Jno. D. Greenamyer, M. D., Niles city, Berrien county.*

51. "From cases in Indiana where child came from."—*L. L. Kelly, M. D., Farwell village, Clare county.*

51. "From Indiana."—*W. H. Landis, M. D., Campbell township, Ionia county.*

51. "Indiana."—*E. I. Allen, M. D., Golden township, Oceana county.*

51. "Came from Indiana during incubation stage, 'took it' here and spread it to other cases."—*W. C. Hontz, M. D., Leonidas township, St. Joseph county.*

51. "Mr. W—— came from Indiana on a visit to friends."—*S B. Follett, M. D., Sturgis village, St. Joseph county.*

52. "Kansas."—*Wm. A. Oliver, M. D., Camden township, Hillsdale county.*

53. "Imported from Duluth [Minn.]."—*Andrew Dickie, Montmorency township, Montmorency county.*

54. "Minnesota."—*Geo. L. LeFevre, M. D., Muskegon city, Muskegon county.*

55. "Brought from New York state where one of the children had it, and the other when he arrived home."—*D. W. Mitchell, M. D., Harrisville township, Alcona county.*

56. "From Ohio."—*Phylander Palmer, M. D., Salem township, Allegan county.*

57. "A child from Toledo, Ohio, came here to visit who had just recovered."—*Sarah A. Cole, M. D., Port Austin village, Huron county.*

57. "A gentleman from Toledo, Ohio, came here with measles."—*Henry C. Hawley, M. D., Hesperia village, Newaygo county.*

58. "On shipboard."—*S. D. Yerington, M. D., McBain village, Missaukee county.*

59. "First case was a young man who had just returned from Oregon. He had been here less than ten days when taken."—*D. A. Hatt, M. D., Paradise township, Grand Traverse county.*

60. "A child was exposed in Ellis Junction, Wis."—*H. L. Rosenberry, M. D., Menominee city, Menominee county.*

61. "Patient came from Milwaukee, Wis."—*Geo. L. LeFevre, M. D., Muskegon city, Muskegon county.*

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* "Second" and "third" localities infected from Chicago.

### *Probable Movement of Infection Inside of the State.*

62. "I presume this outbreak of measles in this village is caused by the outbreak in Douglas village, but do not know positive enough to say."—*Henry H. Stimson, M. D., Saugatuck village, Allegan county.*

62. "It must have been communicated by the usual business and social relations between the township and village of Saugatuck and Douglas, the disease being light, no one feared it."—*Henry H. Stimson, M. D., Saugatuck township, Allegan county.*

63. "Supposed in Bay City."—*Eli Dutton, Fraser township, Bay county.*

64. "It was thought to have been contracted in Benton Harbor at a religious meeting."—*L. Osborne, M. D., Vandalia village, Cass county.*

65. "A lady went visiting to Flint, I think. A child she took with her was exposed to measles."—*H. H. Mair, clerk, Almont township, Lapeer county.*

66. "Mrs. C—— supposed she rode in a street car with a case of measles in Grand Rapids."—*G. W. Lowry, M. D., Hastings city, Barry county.*

66. "Supposed to have been contracted while visiting Grand Rapids."—*J. A. Stoddard, Paris township, Kent county.*

67. "Unknown. Probably from Saginaw."—*John C. Avery, M. D., Vassar village, Tuscola county.*

### *Probable Movement of Infection from Outside of the State.*

68. "Family moved in from South Chicago. Did not know where she was exposed, but thought it was on the cars."—*W. Bates, M. D., Ransom township, Hillsdale county.*

68. "Supposed from a lady returned from Chicago."—*Michael Cassidy, Newton township, Mackinac county.*

68. "Developed after arrival from Chicago."—*James H. Bogan, M. D., Mackinac Island, Mackinac county.*

68. "Mr. B—— had been to Chicago and did not know what the trouble was. He called in his family physician and he told him he had measles."—*Allen Campbell, Groveland township, Oakland county.*

69. "Probably from Indiana."—*C. Van Zwaluwenburg, Kalamazoo city, Kalamazoo county.*

## NEGLECT OF MEASURES TO RESTRICT MEASLES, VIOLATIONS OF PUBLIC HEALTH LAWS, ETC.—RESULTS.

### *Outbreak of Measles in Wright Township, Hillsdale County.*

There was an outbreak of measles in Wright township, Hillsdale county reported by the health officer, W. J. Barnes, M. D., to have commenced in July, 1893, and the last case, of the four cases reported at this time, to have recovered on August 14. Dr. Barnes reports that he was not informed of the outbreak until the patients had recovered, and the house disinfected by the parents and the attending physician. Evidently disinfection was not thoroughly done, for on Dec. 10, another case was taken with measles, twenty days after having slept on a cot that a patient had slept on who had measles last June. The cot had not been fumigated. Dr. Barnes did not see this patient until about well, but the second one was isolated, and he states that there were no exceptions to the complete restriction of the disease after he saw the first patient.

### *Outbreak of Measles in Coldwater City, Branch County.*

In an outbreak of measles in Coldwater city, Branch county, the health officer, Dr. W. L. Ford, reported that the first case was an employee in a hotel, who continued to work for two or three days after he was taken sick. There were two later cases reported as living at a hotel, but no further facts were given. The following letter was received at this office, from Dr. Ford, May 10, 1893:—

"In reply to your communication relative to measles report, I would state that there were so many cases, between three and four hundred, that the board of health decided to pay no attention to them, consequently I could give you no accurate knowledge concerning them."

### *Outbreak of Measles in Dryden Township, Lapeer County.*

In regard to failure to use restrictive measures in an outbreak of measles in Dryden township, Lapeer county, the health officer, Dr. John S. Caulkins, wrote that the patients were isolated from all except the nurse and physician, "more or less strictly, most of them having had no physician," and that disinfection was not used for measles. He reports about 150 cases in 40 households, traces all to previous cases, and in regard to the source of contagion wrote as follows:—

"The disease was brought into our township by a stranger who hired to a hay-presser and fell sick right away. The employer's children got it from him and they infected the school. From there it spread over the township."

### *Outbreak of Measles in Almont Township, Lapeer County.*

In an outbreak of measles in Almont township, Lapeer county, 148 cases were reported to have occurred. The following extract is from a letter received at this Office, May 16, 1893, from Dr. A. Price, health officer of Almont township:—

"As to our present serious epidemic of measles. It started from two sources. A girl came here from Dryden from a family having the disease. When she was taken sick she went back to her home, but not before exposing one girl here. Another way, and the one attended with the worst results, was, a lady went visiting (to Flint, I think). A child she took with her was exposed to measles. She came home, the child was taken sick and broke out. They continued sending five or six others to school. Did not report the first case. Claim not to have known what was the trouble and child not sick enough to require a physician. At the end of two weeks the others in the family began to be sick and I was called. We quarantined them, but the mischief was done, and the entire school exposed. As a result we have any number of cases. I have tried to have the town and corporation boards take some action by which I could have proper reports made, but have been unable to do so so far. They do not feel inclined to go to any expense."

### *Outbreak of Measles in Benzonia Township, Benzie County.*

In an outbreak of measles in Benzonia township, Benzie county, the health officer, W. E. Bailey, traced the source of contagion to a family of immigrants that had just come from the old country. Two children in this family were taken sick about June 14, and previous to July 6, had not been reported to the health officer and no physician had been called. From this family it spread to one other family and resulted in one death. Owing to the isolated situation of the families, being in remote farmhouses, the outbreak was limited to six cases, five of which were traced to a former case.

### *Outbreak of Measles in Hudson City, Lenawee County.*

An outbreak of measles in Hudson city was grossly neglected both as to isolation and disinfection. The health officer, Dr. J. R. Dodge, reported that he thought it was brought there by a child who came there visiting from the western part of the State. That as a rule no effort had been made to isolate, the schools ran right along, children coming down in school. That "the largest part of the epidemic was over when he came into office, and he let it go on in the same old rut." There were 150 cases reported to have occurred in this outbreak.

### *Outbreak of Measles in Cheboygan City, Cheboygan County.*

An outbreak of measles in Cheboygan city, Cheboygan county, was reported by the health officer, S. A. St. Amour, M. D., to have been entirely neglected, no disinfection or isolation, and public funerals. Dr. St. Amour reports that 150 households had the disease.

### *Outbreak of Measles in Hayes township, Charlevoix County.*

A. W. Chew, health officer of Hayes township, Charlevoix county, reported, relative to an outbreak of measles in his jurisdiction, that no apparent effort was made to check the disease, and that all of the 75 cases reported to have occurred in this outbreak, were traced to a former case.

### *Outbreak of Measles in Oscoda Village, Iosco County.*

During an outbreak of measles in Oscoda village, Iosco county, the superintendent of the public schools, Nina M. Stephens, wrote, Feb. 20, 1893, the following questions to the Secretary of the State Board of Health:—

"Will you kindly state whether children coming from homes in which members of the family have the measles should be allowed to attend the public schools? Would the fact that the children wishing to attend school had had the measles at some former time give such children the right to attend? Please answer the same questions relative to whooping cough."

Secretary Baker sent the following reply to these questions Feb. 23, 1893:—

"Measles is a 'disease dangerous to the public health,' and the same precautions should be taken to prevent its spread as are taken in outbreaks of other diseases dangerous to the public health. The law requires that all sick *or infected* with such a disease be isolated until all danger of their communicating the disease to others is past. Therefore, children who reside in families where the disease is present, should not be allowed to attend school or to mingle with others. The 'fact that the children wishing to attend school had had the measles at some former time' does not give them the 'right to attend' the schools. They are not as liable to carry the contagium of the disease to susceptible children, as if they had never had the disease, yet they may carry it.

"What is said relative to measles in this letter can also be said relative to whooping-cough."

### *Outbreak of Measles in Salem Township, Allegan County.*

The source of contagium of an outbreak of measles in Salem township, Allegan county, was reported by the health officer, Dr. Phylander Palmer, to have been from Ohio; 84 cases with one death were reported as having occurred in this outbreak, all of which were traced to a former case of the disease. Only 25 pounds of sulphur were used in 24 households, and other restrictive measures were neglected.

### *Outbreak of Measles in Adrian City, Lenawee County.*

There were 405 cases with two deaths reported in an outbreak of measles in Adrian city, Lenawee county, commencing in January, 1893.

The health officer, Dr. Frank E. Andrews, wrote, Aug. 21, 1893, as follows:—

"Measles have been epidemic in Adrian for over one year. Previous to my appointment as health officer, no restrictions had been placed upon patients that I have been able to find out. Houses were placarded and the sick isolated as far as possible in every case since May 1. The houses have not been fumigated, but discharges have in nearly all cases been disinfected."

Again in December, 1893, Dr. Andrews wrote to this Office as follows:—

"Since May I have disinfected some of the houses, but not all, for the reason that they were in the German part of the city and would not be reported until after child was around. It would be impossible for me to make a report of any value as to the efficacy of disinfection."

### *Outbreak of Measles in Marquette City, Marquette County.*

Relative to an outbreak of measles in Marquette city, Marquette county, in which 395 cases with 1 death were reported to have occurred, the health officer, G. J. Northrop, M. D., wrote, Feb. 28, 1893, the following letter to the Secretary of the State Board of Health, and enclosed the following extract, taken from the "Mining Journal:"—

"I do not know that one-quarter of the cases of measles are seen and reported by the physicians. None whatever by the parents, and from what I hear, I do not know that even ten per cent of the cases of measles are reported and placarded. The impression prevails that measles is not a dangerous disease, and the city attorney is taking sides against me, claiming that they are not mentioned in the law and that the houses should not be placarded, and that they do not do so in Detroit.

"The State law is defective in that it does not require physicians to report the recovery or death of any contagious disease, and I have no means of knowing when they recover, if they do, or the number of cases remaining on hand for weekly reports.

"I find no law regulating the attendance at school of sick children or children from families in which a contagious disease prevails. Here children are going to school while their houses are placarded for measles, also from families in which the presence of the disease is not reported.

"Is there any law regulating this matter and requiring a certificate from the attending physician, or health officer, before the child is allowed to return to school? If so, where can it be found? On Sunday last I placarded two houses, one of them being our city attorney's, whose wife had told a caller that her child had measles, or that she thought it had. The child was sick and had an eruption and an older child had been sick and out of school the week before with an eruptive disease and they had assumed that it was not measles and had allowed a child to attend school, and four teachers rooming in their house to remain and care for their schools. Having acted upon this information and placarded his house he now threatens me with a law-suit, and says that I cannot prove that his children have had measles. I find that I cannot, as his wife's statements are not admissible as evidence against him and as 'not proven' he would go free.

"In another family where they believe in, and are treated by, a Christian Scientist, they have had several cases of measles, or as they put it, 'belief in measles,' while one or more children have attended school and a niece whose home is in this family is a teacher and has been in daily attendance at school. No cases of measles, though, have been known in her room. I also put up the measles card on this house, for which our city attorney condemns me, and I expect to be prosecuted for that, too.

"What can or should be done in such a condition of ignorance under present circumstances? What should be done with the Metaphysicians? Please send me a supply of your measles pamphlets.

"There is no law regulating the time that cards shall remain up or when or by whom they shall be taken down, nor is there any penalty for removing, defacing or destroying them. What can be done? The card is gone, and some friend must have removed it that did not like to see it there or the wind must have blown it down, etc.

"Has the local board authority to deal with all these points or must it be by city ordinance? Can you send us the blanks used by your local board as well as their regulations and your city ordinances? What town or city in this, or other State, can furnish me the best blanks, regulations and ordinances?

"Please send me as prompt replies as possible. We have a special meeting of the board of health called for Saturday evening, and I should be glad if possible to have something from you to present them.

"Any information or suggestion would be acceptable.

"Can you tell me the proper steps to take in closing a school or quarantining a teacher, as I did on Sunday, other than informing them as health officer that they must remain at home?"

The following quotations from "The Mining Journal" of Feb. 27 and 28, 1893, were inclosed in Dr. Northrop's letter to Dr. Baker:—

Feb. 27.—"Measles, especially in the form known as German measles or rötheln, are almost epidemic in Marquette at the present teme and are spreading rapidly in every direction. This is largely due to the fact that householders and physicians have almost entirely disregarded the State laws regarding contagious diseases, and have not reported the cases to the health officer or the board of health, so that the circle of exposure has constantly widened.

"Yesterday the health officer quarantined five of the teachers in the city schools whom he found had been exposed, and gave notice accordingly to the school board, which will supply their places today.

"Some people seem to think that measles is not on the list of 'diseases dangerous to the public health,' and may be surprised to find that among eruptive diseases statistics show that measles ranks next to scarlet fever in the number of deaths caused annually in this State, while whooping-cough, measles, rötheln (or 'German measles'), diphtheria, scarlet fever, typhus fever, typhoid fever, puerperal fever, erysipelas, small-pox, cholera, etc., are all classed as 'diseases dangerous to the public health,' and must be reported to the health officer and be properly placarded by him.

"The State law requires this both on the part of the householder and of the attending physician, and failure to comply with the law is a misdemeanor punishable with a fine or imprisonment. It is a notorious fact that measles is spreading throughout the schools, and while the health officer, Dr. Northrop, has no desire to be arbitrary, he has a duty to fulfill and cannot permit this disregard of the provisions of the law to continue. The prosecuting attorney is required by the law to prosecute all such cases within his county, and the health officer is also required by law to notify the prosecuting attorney of all violations of the law coming within his knowledge, hence no one who has failed to notify the health officer promptly of the existence of a contagious disease within his family need be surprised if he finds himself brought into court at an early date for the offense.

"That none may be in ignorance of the provisions of the law, which is carefully framed to protect the public at large from exposure to contagious diseases, 'The Mining Journal' publishes herewith the full text of the two most important sections thereof."

The sections above mentioned as quoted by "The Mining Journal," were § 1675 Howell's Statutes, as amended by act 37, laws of 1889, and § 1676 Howell's Statutes, as amended by act 11, laws of 1883.

Feb. 28.—"The vigorous shaking up on the subject of 'diseases dangerous to the public health' given the people at large through the columns of 'The Mining Journal' yesterday morning by the city health officer was not without its effect yesterday, though it is asserted by many that the cases of failure to report contagious cases promptly had not been as great as Dr. Northrop had been led to believe, and many charged with disregarding the provisions of the statute declare that an injustice had been done them in that there is not now and has not been a case of measles or other disease dangerous to the public health in their households.

"While in certain cases this may undoubtedly be true, it is equally true that there has been great looseness in Marquette in the past in regard to reporting contagious diseases, and 'The Mining Journal' is disposed to uphold the health officer in his effort to bring about a change for the better.

"Dr. Northrop may have acted in some of the cases which he posted Saturday and Sunday upon information which was misleading, but even in such cases the greatest injury was probably to the æsthetic tastes of the members of the placarded household by the presence of the obnoxious card, and it is most assuredly better for the public at large that mistakes of that kind should occur than that cases highly dangerous to the public health should not be reported and that persons shall be exposed to disease because of the absence of the card which would have warned them. 'The Mining Journal' could name one or two cases of diphtheria recently in which this very thing has occurred.

"The position of health officer is a peculiarly trying one, and a man who endeavors to conscientiously attend to its duties is bound to get into a good deal of hot water, as the saying is, but 'The Mining Journal' is glad to receive the assurance of a number of the physicians in the city to the effect that they will at all times do their utmost to assist Dr. Northrop by reporting all suspected or known cases of dangerous diseases promptly and fully, and it believes that the common sense of the people will show them that the doctor is subserving the greatest good of the greatest number by zealously discharging the duties of his office, and that in any cases where mistakes have been or may be made the error will, upon reflection, be cheerfully condoned."

In reply to the above letter from Dr. G. J. Northrop, the following letter was sent by Secretary Baker, March 3, 1893:—

"Accept thanks for your letter of Feb. 28, and outbreak reports relative to scarlet fever and measles, which have just been received.

"The people of Marquette are to be congratulated upon the proper position taken by the 'Mining Journal,' as shown by the two clippings sent with your letter.

"The laws of this State give to local boards of health and to local health officers almost absolute power over everything relating to the restriction and prevention of diseases. Measles and rötheln are diseases 'dangerous to the public health,' and Act 137, Laws of 1883, requires that the health officer shall take action to restrict the spread of all such diseases. The State law may be defective in that it does not 'require physicians to report the recovery or death of any contagious disease;' but the Act referred to above requires the health officer to order the isolation of all sick or infected and they should not be released from isolation except by the orders of the health officer; he is supposed to have oversight, through inspectors, etc., so long as a dangerous disease exists, consequently he is enabled to know when the patients have recovered. The law also requires that the health officer shall supervise the funeral of any person who dies from a dangerous communicable disease, therefore he is required to learn when the death occurs. All deaths should be at once reported to the health officer or city clerk, and burial permits only issued thereon.

"You say,—'I find no law regulating the attendance at school of sick children or children from families in which contagious diseases prevail.' See the Act referred to above (Act 137, Laws of 1883), which requires the health officer to *order the isolation of all sick persons.* I think this Act 137, Laws of 1883, covers the question relative to 'requiring a certificate from the health officer before the child is allowed to return to school.' The certificate should be from the health officer.

"The law, Sec. 2, of Act 137, Laws of 1883, provides punishment for any one who disobeys the orders of the health officer, properly made under that Act. A placard must not be removed except by the orders of the health officer, or by the health officer himself. See Act 137, Laws of 1883.

"Teachers who are infected with a dangerous communicable disease should not be allowed to continue their avocation, and should be isolated until such a time as the health officer deems it safe to release them.

"You ask,—'What should be done with the metaphysicians?'

"See page 9, of the enclosed pamphlet. The law makes it the duty of the health officer and the supervisor in each township, village, city and ward to enforce Act No. 167, Laws of 1883.

"You say,—'There is no law regulating the time that cards shall remain up, or when or by whom they shall be taken down.'

"The order of the health officer made in accordance with the law, *is law.* There *is* a penalty for the violation of the orders of the health officer. See section 2 of Act 137, Laws of 1883.

"You ask,—'Has the local board authority to deal with all these points or must it be by city ordinance?' The *health officer* has the power, and it is his duty, under Act 137, Laws of 1883.

"I enclose a copy of the 'Rules and Regulations of the Board of Health of the city of Owosso,' which I think are very good ones.

"You ask,—'Can you tell me the proper steps to take in closing a school?' Unless you can give orders direct to controlling person or persons, the order should be general and public,—published.

"I send you by this mail 100 of the pamphlets 'Restriction and Prevention of Measles,' in response to your request."

The difficulty experienced by local health officers in enforcing restrictive measures in outbreaks of measles, because of the quite general belief on the part of parents that measles cannot be escaped and is less apt to prove fatal if had when young, is shown by the reports of the health officers in the following outbreaks:—

### *Outbreak of Measles in Fraser Township, Bay County.*

In an outbreak of measles in Fraser township, Bay county, the health officer, Eli Dutton, wrote that it was not definitely known where the first case was exposed, but it was supposed to have been in Bay City, and this family spread the disease to others by direct contagion. The first case was reported to have been taken sick about Jan. 1, 1893, and the last case about Feb. 1. There were 88 cases and 2 deaths in this outbreak, of which all but the first case could be traced to a former case. Mr. Dutton reports that about three-fourths of the cases were kept isolated, but very many householders, instead of reporting the disease to him, concealed the facts, and some "even sought the disease thinking it a good time to have it." He states that the cases not reported were usually of a mild form. In this outbreak but five pounds of sulphur were used in the 22 households, and other measures of disinfection were wholly disregarded. Mr. Dutton reports that one funeral was held in an unused house and attended by none liable to the disease.

### *Outbreak of Measles in Ganges Township, Allegan County.*

Dr. Eugene E. Brunson, the health officer of Ganges township, Allegan county, reports that measles was brought into his jurisdiction by some of the young people attending school in Douglas, where the epidemic of measles broke out The disease rapidly spread in his township in spite of efforts on his part to use precautionary measures because many people were indifferent or wished their families to have the measles, some taking their children into houses where they had the disease and exposing them purposely. There were 100 cases reported in this outbreak (three cases occurred in 1892) and nearly all of these were traced to a former case.

### *Outbreak of Measles in Rollin Township, Lenawee County.*

An outbreak of measles in Rollin township, Lenawee county, began in January, 1893, and ended the following April. In this outbreak there were reported to have occurred 100 cases. The health officer, Wm. B. Town, M. D., reported that he did not isolate or disinfect, that he advised, but no attention was paid, that "many do not employ a physician and they want their children to have the measles."

### *Outbreak of Measles in Saugatuck village, Allegan County.*

Another instance of a desire of people to have measles occurred during an outbreak of this disease in the village of Saugatuck, Allegan county. The health officer of this village, Dr. Henry H. Stimson, reports as follows:—

> "All had the disease because it was very light and they desired to have it, and would go and be exposed, not heeding warning. Those who have not had them seem rather anxious to have them and done with it as they express it."

### *Outbreak of Measles in Mecosta Village, Mecosta County.*

Concerning an outbreak of measles in Mecosta village, Mecosta county, the health officer, John Snyder, M. D., reported that all but one of the 37 cases in this outbreak could be traced to a former case of the disease and that efforts to restrict the spread of this disease were of no avail. In regard to this failure he wrote:—

> "It would be an easy matter to regulate any other contagious disease but measles. People have no respect for it. It is difficult to keep people away because they think measles one must have."

### *Outbreak of Measles in Bushnell Township, Montcalm County.*

In regard to restricting an outbreak of measles in Bushnell township, Montcalm county, the health officer, J. A. Lovett, M. D., reported as follows:—

> "Am doing all I can to suppress them but find it quite difficult, as there are many parents that want their children to have them when small, and take them on purpose to have them contract them."

### *Outbreak of Measles in Cannon Township, Kent County.*

The following report relative to an outbreak of measles in Cannon township, Kent county, was received from Dr. Aaron Clark, health officer of this township:—

"One trouble about restricting measles in a country community is that parents will insist on exposing their children because they think it is a good thing to have them while they are young."

### *Outbreak of Measles in Union City Village, Branch County.*

In an outbreak of measles in Union City village, Branch county, the health officer, E. H. Hurd, M. D., reported that the first case was a visitor from Coldwater, who came down with the disease while in Union City. There were 33 cases and two deaths reported to have occurred in this outbreak, and 11 of these were traced to a former case. Dr. Hurd also reported as follows:—

"The outbreak was very light, and people who had children liable to contract the disease took them into the disease that they might contract the disease, and in only a small per cent of the cases was a physician called to treat the children, and not one in five of the cases was reported either to a physician or to myself."

## OUTBREAKS IN WHICH ISOLATION AND DISINFECTION WERE ENFORCED.—RESULTS.

The following is the substance of a few representative statements of health officers whose reports indicated that they had quite fully enforced isolation in outbreaks of measles:—

### *Outbreak of Measles in Ionia City, Ionia County.*

Relative to an outbreak of measles in Ionia city, Ionia county, the ex-health officer, Jas. G. Conner, M. D., reported in substance as follows:—

The first and only case came from Clarkeville, Mich., and was promptly isolated from all but the nurse and the physician. The discharges of the patient were disinfected by chloride of lime, and the contents of the privy-vault by four pounds of chloride of lime. All the rooms of the house, the privy and all infected clothing, bedding, etc., were disinfected by fumes of burning sulphur, the rooms at the rate of three pounds per 1,000 cubic feet of space.

### *Outbreak of Measles in Troy Township, Oakland County.*

In regard to restrictive measures used in an outbreak of measles in Troy township, Oakland county, the health officer, J. W. Anderson, M. D., reported substantially as follows:—

The house was placarded and the patient was isolated from all persons except the nurse and the physician. The discharges of the patient were disinfected by carbolic acid and lime and then buried. The contents of the privy-vault were disinfected by lime and ashes. All the rooms of the house, the garret, the privy and all infected clothing, bedding, etc., were disinfected by fumes of burning sulphur, the rooms at the rate of three pounds of sulphur per 1,000 cubic feet of space.

### *Outbreak of Measles in Marcellus Township, Cass County.*

Concerning an outbreak of measles in Marcellus township, Cass county, the health officer, Dr. Fred Shillito, wrote in substance as follows:—

A young doctor contracted measles in Chicago, and came home, exposing his brother and sisters and three children of a neighbor. All the patients were isolated from all except the nurse and the physician as soon as the diagnosis was made, but, previous to this, seven were exposed. There were no new cases after isolation was established.

### *Outbreak of Measles in Potterville Village, Eaton County.*

Regarding an outbreak of measles in Potterville village, Eaton county, the health officer, E. R. Espie, M. D., reported substantially as follows:—

The first case was exposed in Chicago. By strict quarantine the disease was confined to the one house. The patients were isolated from all except the nurse and the physician. After the patients recovered all the rooms of the house and all infected clothing, bedding, etc., were disinfected by fumes of burning sulphur, the rooms at the rate of three pounds of sulphur per 1,000 cubic feet of space.

## ESTIMATED NUMBER OF OUTBREAKS AND CASES OF MEASLES PREVENTED AND LIVES SAVED BY ISOLATION AND DISINFECTION.

Tables 9 and 10 and the following diagram compare the average numbers of cases and deaths in outbreaks of measles where the measures of isolation and disinfection, prescribed by the Michigan State Board of Health, were enforced, with the average numbers of cases and deaths in those outbreaks where these measures were neglected.* By Table 10 it may be seen that during the four years, 1890–93, there were about 29 times as many cases per outbreak in those outbreaks in which these measures were neglected as in those outbreaks in which they were enforced; and that while there were six-tenths of one death per outbreak where restrictive measures were neglected, no deaths occurred where those measures were enforced

By Table 9 it may be seen that during the year 1893 there were reported to the office of the State Board of Health 357 outbreaks of measles with 5,440 cases and 71 deaths. Had no efforts at restriction been made, and had the average numbers of cases and deaths per outbreak remained the same as in the column headed "Isolation and Disinfection both Neglected," there would have occurred 13,673 cases and 71 deaths, and taking from these respectively the cases (5,440) and deaths (71) which did occur, leaves 8,233 cases and no deaths indicated as prevented in these 357 outbreaks, by isolation and disinfection. By the same method for each year the indicated saving in the 1,404 outbreaks which occurred during the four years, 1890–93, is 63,275 cases and 552 lives. This is shown in Table 10.

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* *Definition of Outbreak.*—For studying the influence of isolation and disinfection in restricting outbreaks of communicable disease, an outbreak is considered as, the existence of one or more cases of a particular communicable disease within any health officer's jurisdiction, whether city, village, or township. All cases of the disease occurring within the jurisdiction during the outbreak are considered as part of the outbreak, unless the contagium cannot be traced to cases within the jurisdiction, and can be traced to cases outside of the jurisdiction, in which instance they are considered as constituting a separate outbreak. When a period of over 60 days has elapsed since the last case (in a given jurisdiction) died or recovered, the outbreak is considered as ended,—unless new cases occur the contagium of which can be traced back to the preceding cases, in which instance the later cases are considered as part of the same outbreak.

In the compilation of the reports for Tables 9 and 10 and the diagram showing the results obtained by isolation and disinfection, every effort has been made to place the numbers of cases and deaths in each outbreak in the proper columns. If, for instance, there were only one or two cases in an outbreak and the health officer neglected to isolate or disinfect, but for some reason the disease spread no further, the number of cases and deaths were placed in the column headed "Isolation and Disinfection both Neglected." If, on the other hand, as often occurs, quite a number of persons are exposed at the same time and place outside the health officer's jurisdiction, and by proper isolation and disinfection he succeeds in confining the disease to the original cases exposed, they are placed in the column headed, "Isolation and Disinfection Enforced." If, however, he neglects to properly isolate or disinfect, the whole number of these cases and deaths are placed in the "neglected" column. It is to be regretted that many of the reports received at this office do not state exactly what was done to restrict the disease, or are not sufficiently definite to enable the compilers to decide just what was done, and they are obliged to place all such in the column headed "Isolation or Disinfection or both not mentioned, or statements doubtful."

RESTRICTION OF MEASLES IN MICHIGAN.

TABLE 9.—*Measles in Michigan in 1893; Exhibiting the Average Numbers of Cases and Deaths per Outbreak:—(1) in all the 357 outbreaks reported; (2) in the 238 outbreaks in which it is doubtful whether or not Disinfection or Isolation was enforced; (3) in the 2 outbreaks in which Disinfection was enforced and Isolation was doubtful; (4) in the 25 outbreaks in which Isolation was enforced and Disinfection was doubtful; (5) in the 8 outbreaks in which Isolation was enforced and Disinfection was neglected; (6) in the 4 outbreaks in which Disinfection was enforced and Isolation was neglected; (7) in the 70 outbreaks in which both Isolation and Disinfection were neglected; (8) in the 10 outbreaks in which both Isolation and Disinfection were enforced.*

| | (1) All outbreaks. (357 outbreaks.*) | | (2) Isolation or Disinfection or both not mentioned, or statements doubtful. (238 outbreaks.) | | (3) Disinfection enforced —Isolation doubtful. (2 outbreaks.) | | (4) Isolation enforced—Disinfection doubtful. (25 outbreaks.) | | (5) Isolation enforced—Disinfection neglected. (8 outbreaks.) | | (6) Disinfection enforced —Isolation neglected.† (4 outbreaks.) | | (7) Isolation and Disinfection neglected. (70 outbreaks.) | | (8) Isolation and Disinfection enforced. (10 outbreaks.) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. | Cases. | Deaths. |
| Totals.... | 5,440 | 71 | 2,569 | 58 | 2 | 0 | 140 | 5 | 15 | 0 | 29 | 0 | 2,681 | 14 | 24 | 0 |
| Averages.. | 15.21 | 0.19 | 10.79 | 0.22 | 1.0 | 0 | 5.6 | 0.2 | 1.87 | 0 | 7.3 | 0 | 38 3 | 0.2 | 2.4 | 0 |

*Cases and deaths in Detroit and Grand Rapids are not included in this table, because of the difficulty in determining the beginning and ending of an outbreak in these cities, in which the disease is present in some part of the city nearly all the time. Cases, and one reported death, in Coldwater are not included in this table, because the health officer of that city reported that there were so many cases, "between three and four hundred, that the board of health decided to pay no attention to them, consequently I could give no accurate knowledge concerning them."

† A definition of the term "outbreak," and facts relative to methods of compilation of outbreaks, are printed in foot-note on pages 243 and 335 of this Report.

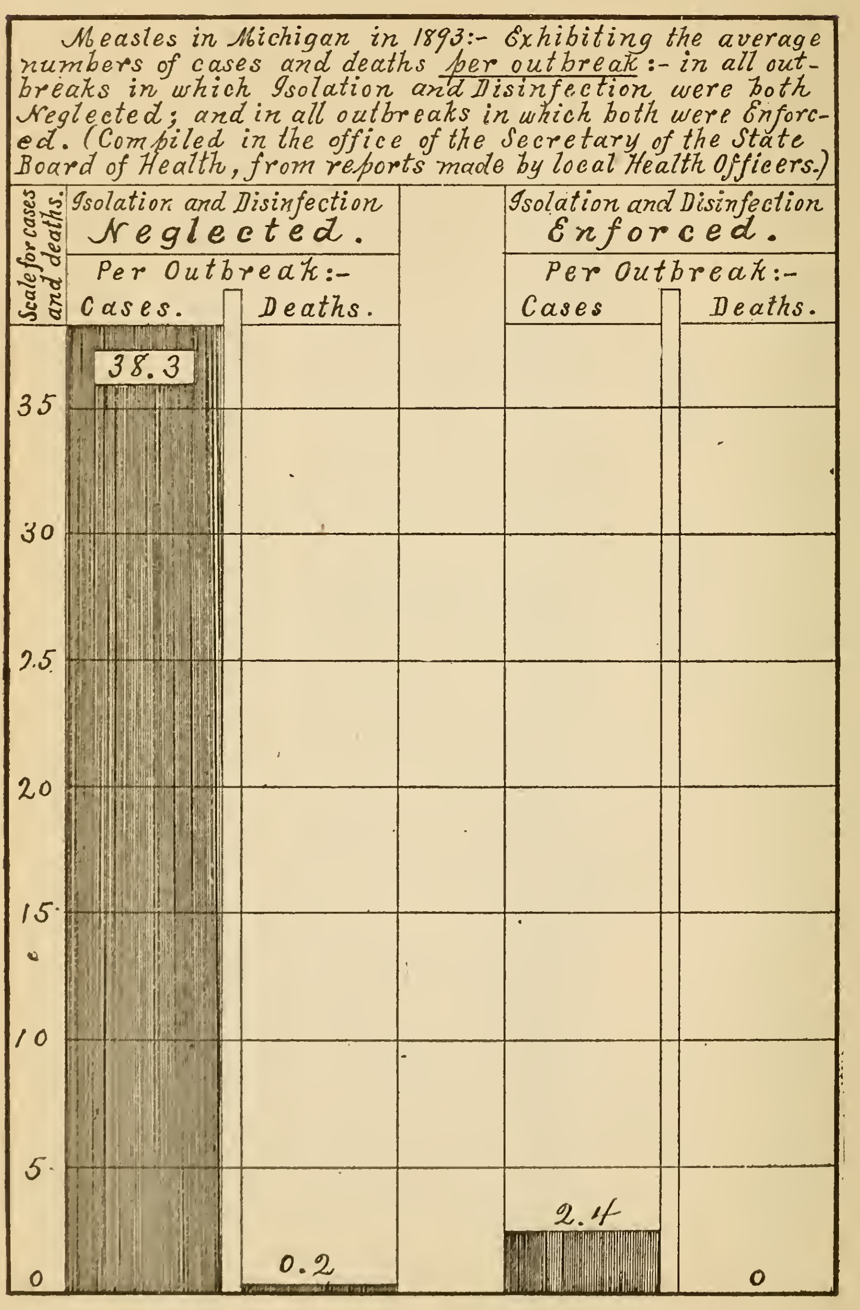
TABLE 10.—*Exhibiting for the four Years, and for each of the four Years, 1890–93, the Numbers of Reported Outbreaks, Cases and Deaths; also for this four-year Period, the average numbers of Cases and Deaths per Outbreak in all outbreaks; in those Outbreaks in which Isolation or Disinfection or both were Doubtful; Isolation and Disinfection both Neglected; Isolation and Disinfection both Enforced; and, also, the Numbers of Cases and Deaths Indicated as having been prevented by Isolation and Disinfection.*

| Years. | All Outbreaks.* | | | Isolation or Disinfection, or both, not Mentioned, or Statements Doubtful. | | | Isolation *and* Disinfection Neglected. | | | Isolation and Disinfection Enforced. | | | Cases and Deaths Indicated as having been prevented by Isolat'n and Disinfection.† | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Out-breaks. | Cases. | Deaths. | Out-breaks. | Cases. | Deaths. | Out-breaks. | Cases. | Deaths. | Out-breaks. | Cases. | Deaths. | Cases. | Deaths. |
| 1890 | 419 | 11,189 | 103 | 358 | 6,326 | 59 | 57 | 4,819 | 44 | 6 | 19 | 0 | 24,233 | 220 |
| 1891 | 392 | 12,338 | 118 | 309 | 6,492 | 59 | 71 | 5,920 | 63 | 11 | 27 | 0 | 20,347 | 231 |
| 1892 | 236 | 4,406 | 67 | 187 | 2,427 | 45 | 31 | 1,953 | 22 | 7 | 8 | 0 | 10,462 | 101 |
| 1893 | 357 | 5,440 | 71 | 238 | 2,569 | 53 | 70 | 2,681 | 14 | 10 | 24 | 0 | 8,233 | 0 |
| Totals | 1,404 | 33,373 | 359 | 1,087 | 17,814 | 216 | 229 | 15,373 | 143 | 34 | 78 | 0 | 63,275 | 552 |
| Averages | 351 | 8,343 | 90 | 272 | 4,454 | 54 | 57 | 3,843 | 36 | 9 | 20 | 0 | 15,819 | 138 |
| Average cases and deaths per outbreak, 1890–93 | ........ | 23.8 | .3 | ........ | 16.4 | .2 | ........ | 67.1 | .6 | ........ | 2.3 | 0 | ........ | ........ |

* For the years 1890–93 inclusive, outbreaks in Detroit and Grand Rapids are not included. For the year 1893 the outbreak in Coldwater is not included. The * foot-note to Table 9 of this article states the reasons why.

† The numbers of cases and deaths in this double column are found by multiplying "all outbreaks" for each year by the average number of cases or deaths per outbreak, in those outbreaks in which Isolation and Disinfection were both Neglected, for that year, and deducting from the results thus obtained the cases or deaths, as the case may be, which were *reported* to have occurred that year.

## Isolation and Disinfection Restrict Measles.



Measles in Michigan in 1893:- Exhibiting the average numbers of cases and deaths per outbreak:- in all outbreaks in which Isolation and Disinfection were both Neglected; and in all outbreaks in which both were Enforced. (Compiled in the office of the Secretary of the State Board of Health, from reports made by local Health Officers.)

[PLATE 783.]

### PERIOD OF INCUBATION, IN MEASLES.

TABLE 11.—*Exhibiting the reported Period of Incubation, stated in days, in 39 cases of Measles. Compiled from reports of health officers in Michigan, for the year 1893.*

| Incubation period—Days | 3 | 4 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 18 | 20 | 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cases in each period | *1 | †3 | ‡7 | 5 | 3 | §7 | ¶1 | 1 | **7 | 2 | 1 | 1 |

* In 1 case it was reported as *about* 3 days.
† In 3 cases it was reported as *about* 4 days.
‡ In 5 of these cases it was reported as *about* 7 days.
§ In 4 of these cases it was reported as *about* 10 days.
¶ In 1 case it was reported as *about* 11 days.
** In 2 of these cases it was reported as *about* 14 days.

The average of the above 39 reported periods of incubation is about 10.3 days.

TABLE 12.—*Exhibiting relative to 26 instances of Measles in Michigan in 1893, the Reported Period of Incubation within certain limits, stated in days; also the Means, the average of which may represent the average Period of Incubation.*

| Days. | Means. | Days. | Means. | Days. | Means. | Days. | Means. |
|---|---|---|---|---|---|---|---|
| 3 to 10 | 6.5 | 8 to 13 | 10.5 | 10 to 14 | 12. | 14 to 21 | 17. |
| 5 to 10 | 7.5 | 8 to 21 | 14.5 | 10 to 14 | 12. | 14 to 21 | 17. |
| 5 to 10 | 7.5 | 9 to 14 | 11.5 | 10 to 14 | 12. | 14 to 21 | 17. |
| 6 to 12 | 9. | 10 to 12 | 11. | 10 to 14 | 12. | 14 to 21 | 17. |
| 7 to 14 | 10.5 | 10 to 14 | 12. | 10 to 14 | 12. | 14 to 21 | 17. |
| 7 to 21 | 14. | 10 to 14 | 12. | 12 to 14 | 13. | 14 to 21 | 17. |
| 7 to 21 | 14. | 10 to 14 | 12. | | | | |

The average of all the means, for the 26 instances is 12.6 days.

### AGES OF GREATEST PREVALENCE OF, AND MORTALITY FROM MEASLES.

The reports of local health officers in Michigan, for the year 1893, gave the ages of 3,064 persons who were sick with measles, and of 22 persons who died of that disease. Table 13 represents, in certain age-groups, the numbers of cases and of deaths from measles; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of the cases in that group; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in special groups were of all deaths,—compiled from all reports for the year 1893 which stated the ages.

By this table (13) it may be seen that the greatest proportion of cases of measles was of children under 11 years of age, 67.6 per cent of all cases having occurred in that age-period; that 25.8 per cent of cases were of persons from 11 to 25 years of age; and 7.1 per cent were of persons over 25 years of age.

The greatest proportion of deaths from measles occurred in children under 6 years of age, 41 per cent of all deaths having occurred in that age period; 54.6 per cent of all deaths were of children under 11 years of age; 18.2 per cent of all deaths were of persons of 11 to 26 years of age, and 27.2 per cent were of persons over 25 years of age.

There are two erroneous and very harmful beliefs, quite prevalent among parents,—that measles cannot ultimately be escaped any more than teething, and that the least dangerous time for persons to have the disease is while quite young children. Whatever ground there may be for these beliefs elsewhere, Table 9 and the diagram illustrative of it, and Tables 13 and 14 and the diagram illustrating Table 14, of this article show that none exists in Michigan; but that on the contrary, facts here bear evidence that measles is a preventable disease; and that it is *more* fatal to children under ten years of age than to older persons.

TABLE 13.—*Exhibiting in certain Age-groups, the number of cases and the number of deaths from Measles; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths; and the per cent that the deaths in each group were of the cases in that group,—Compiled from all reports for the year 1893 which stated the ages.*

| | Number and per cent of Cases and Deaths in certain Age-groups.* | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ages in Groups of years ..... ...... | All ages known. | 0–1. | 1–2. | 2–3. | 3–4. | 4–5. | 0–5. | 6–10. | 11–15. | 16–20. | 21–25. | 26–30. | 31–35. | 36–40. | 41–45. | 46–50. | 51–55. | 56–60. | Over 60. |
| No. of cases...... | †3,064 | 203 | 183 | 172 | 195 | 253 | 996 | 1077 | 350 | 285 | 139 | 93 | 65 | 28 | 17 | 5 | 5 | 2 | 2 |
| Per cent the cases in each group were of all cases. | 100 | 6.6 | 6. | 5.6 | 6.4 | 8.2 | 32.5 | 35.1 | 12. | 9.3 | 4.5 | 3. | 2.1 | .9 | .6 | .2 | .2 | .07 | .07 |
| No. of Deaths.... | 22 | 3 | 2 | 0 | 4 | 0 | 9 | 3 | 2 | 1 | 1 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 1 |
| Per c't the deaths in each group were of cases in that group...... | .7 | 1.5 | 1.1 | 0 | 2.1 | 0 | .9 | .3 | .6 | .4 | .7 | 2.2 | 3.1 | 0 | 5.9 | 0 | 0 | 0 | 50. |
| Per c't the deaths in each group were of all deaths | 100 | 13.6 | 9.1 | 0 | 18.2 | 0 | 41. | 13.6 | 9.1 | 4.5 | 4.5 | 9.1 | 9.1 | 0 | 4.5 | 0 | 0 | 0 | 4.5 |
| Per c't the deaths in special group were of all deaths | ...... | 41.0 | | | | | | 54.6 | | 18.2 | | | 22.7 | | | | 4.5 | | |

* In each age-group the first and last numbers are both included.

† Does not include those cases or deaths where the age was not stated.

Table 14 exhibits the numbers of cases and deaths, in which the ages were stated; the per cent the cases in each age-group were of all cases, and the per cent the deaths in each age-group were of all deaths in the two years and in each of the two years, 1892–3.

The diagram, "Plate 782," on page 342, illustrates the last line of this table.

TABLE 14.—*Exhibiting in certain Age-groups, the number of cases and the number of deaths from Measles, in the two years and in each of the two years, 1892–93; the per cent that the cases in each group were of all cases; the per cent that the deaths in each group were of all deaths,—Compiled from all reports for the years 1892–93 which stated the ages.*

| Year. | | Total No. included. | Per Cent of Cases and Deaths in certain Age-groups.* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Ages. | 0 to 5. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. | 46 to 50. | 51 to 55. | 56 to 60. | 61 Years and over. |
| 1892. | Cases | 786 | 100 | 28.5 | 30.0 | 18.6 | 12.7 | 3.9 | 2.9 | 1.7 | 1.0 | 0.3 | 0.1 | 0 | 0.1 | 0.1 |
| | Deaths | 34 | 100 | 41.2 | 44.1 | 5.9 | 0 | 2.9 | 2.9 | 0 | 0 | 0 | 0 | 0 | 2.9 | 0 |
| 1893. | Cases | 3,064 | 100 | 32.5 | 35.1 | 12.0 | 9.3 | 4.5 | 3.0 | 2.1 | 0.9 | 0.6 | 0.2 | 0.2 | 0.07 | 0.07 |
| | Deaths | 22 | 100 | 41.0 | 13.6 | 9.1 | 4.5 | 4.5 | 9.1 | 9.1 | 0 | 4.5 | 0 | 0 | 0 | 4.5 |
| 1892-93. | Cases | 3,840 | 100 | 31.8 | 34.2 | 12.9 | 10.0 | 4.4 | 3.0 | 2.0 | 0.9 | 0.5 | 0.2 | 0.1 | 0.1 | 0.1 |
| | Deaths | 56 | 100 | 41.1 | 32.1 | 7.1 | 1.8 | 3.6 | 5.4 | 3.6 | 0 | 1.8 | 0 | 0 | 1.8 | 1.8 |

* In each age-group the first and last numbers are both included.

[ Table 15 has been consolidated with Table 14.]

TABLE 16.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who recovered from Measles, in Michigan, during the year 1893; also the average age and the number of cases included. (Compiled from such reports as stated the ages.)*

| Year. | Sex. | Average age of persons who recovered. Years. | No. of cases included. | Age, in Periods of Years. Per Cent of (non-fatal) Cases in each Period.* | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | All Ages. | Under 6 years. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. | 46 to 50. | 51 to 55. | 56 to 60. | 61 years and over. |
| 1893. | Males | 10.28 | 1,446 | 100 | 31.3 | 37.2 | 10.3 | 8.4 | 5.7 | 3.3 | 2.1 | 1.0 | .5 | .1 | .07 | 0 | .07 |
| | Females | 10.22 | 1,596 | 100 | 33.5 | 33 6 | 12.5 | 10.2 | 3.4 | 2.8 | 2.1 | .9 | .6 | .2 | .3 | .1 | .06 |

* The first and last years in each period are both included.

Table 16 shows that of the 1,446 males reported to have recovered from measles in the year 1893, of which the ages were stated, 37.2 per cent occurred in the age-period from 6 to 10 years, and 31.3 per cent occurred in children under 6 years, 10.3 per cent occurred in the period from 11 to 15 years and from this age-period the per cent greatly decreased.

Of the 1,596 females reported to have recovered from measles in the year 1893, of which the ages were stated, the per cent was nearly the same in the first two age-periods, being 33.5 and 33.6, respectively. In the age-period from 11 to 15 the per cent of cases was 12.5, and from this age-period the per cent of cases greatly decreased.

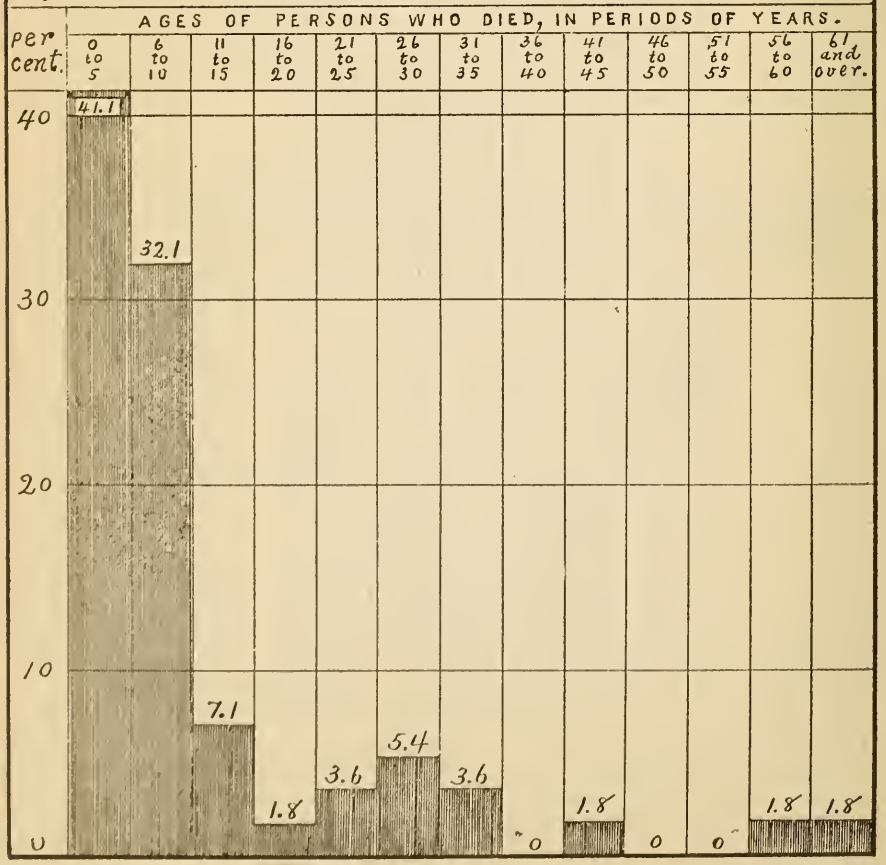
The average age of non-fatal cases was 10.28 years for males and 10.22 years for females.

TABLE 17.—*Exhibiting, by Sex, the per cent of persons in certain Age-groups who died of Measles during the year 1893.*

| Year. | Sex. | Average age of decedents, years. | No. of cases included. | Per cent of deaths in certain Age-groups.* | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | All ages. | Under 6. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. | 46 years and over. |
| 1893. | Males | 11.2 | 10 | 100 | 60 | 10. | 0 | 10 | 0 | 10 | 0 | 0 | 10 | 0 |
| | Females | 19.2 | 12 | 100 | 25 | 16.7 | 16.7 | 0 | 8.3 | 8.3 | 16.7 | 0 | 0 | 8.3 |

* The first and last years in each period are both included.

Diagram.—Exhibiting what per cent of all Deaths from Measles were of persons within certain periods of age. In each period, first and last years are included. (Computed from 56 deaths in Michigan during the 2 years, 1892-93,—all concerning which, the ages were stated.)



[PLATE 782.]

TABLE 18.—*Exhibiting, by Sex for each year of Age, and in certain Age-groups, the number of persons who died from Measles during the year 1893, and the per cent the deaths in each Age-group were of deaths at all ages. (Compiled from such reports to the State Board of Health, as stated the sex and age.)*

| Sex. | Ages in Years, and groups of Years. | Number and per cent of Deaths by Sex, in certain Age-periods. | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | All ages. | 0–5. | | | | | 6–10. | | | | | 11–15. | | | | | 16–20. | | | | | 21–65. | | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 22 | 26 | 28 | 31 and over. |
| Males. | No. of Deaths, by single Years | ---- | 2 | 1 | -- | 3 | -- | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1 | -- | -- | -- | 1 | 1 |
| | No. of Deaths, by Groups of Years | 10 | 6 | | | | | 1 | | | | | 0 | | | | | 1 | | | | | 2 | | | |
| | Per cent the Deaths in each age-group were of the total deaths * among Males | 100 | 60 | | | | | 10 | | | | | ------------ | | | | | 10 | | | | | 20 | | | |
| | Average age at Death, from Measles | 11.2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Females. | No. of Deaths, by single Years | ---- | 1 | 1 | -- | 1 | -- | 1 | -- | -- | -- | 1 | -- | 1 | -- | -- | 1 | -- | -- | -- | -- | -- | 1 | 1 | --- | 3 |
| | No. of Deaths, by Groups of Years | 12 | 3 | | | | | 2 | | | | | 2 | | | | | 0 | | | | | 5 | | | |
| | Per cent the Deaths in each age-group were of the total deaths * among Females | 100 | 25. | | | | | 16.7 | | | | | 16.7 | | | | | 0 | | | | | 41.7 | | | |
| | Average age at Death, from Measles | 19.2 | | | | | | | | | | | | | | | | | | | | | | | | |
| Both Sexes. | No. of Deaths, by single Years | ---- | 3 | 2 | -- | 4 | -- | 2 | -- | -- | -- | 1 | -- | 1 | -- | -- | 1 | -- | -- | -- | 1 | -- | 1 | 1 | 1 | 4 |
| | No. of Deaths, by Groups of Years | 22 | 9 | | | | | 3 | | | | | 2 | | | | | 1 | | | | | 7 | | | |
| | Per ct. the deaths in each age-group were of the total deaths * in both sexes | 100 | 41. | | | | | 13.6 | | | | | 9.1 | | | | | 4.5 | | | | | 31.8 | | | |
| | Average age at Death, from Measles | 15.5 | | | | | | | | | | | | | | | | | | | | | | | | |

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* Deaths from Measles.

Table 17 shows that of the 10 males reported to have died from measles in 1893, of which the ages were given, 60 per cent died before reaching the sixth year of age, 10 per cent died in the age-period from 6 to 10 years, and 10 per cent in each of the age-periods, 16 to 20 years, 26 to 30 years, and 41 to 45 years.

Of the 12 females so reported, 25 per cent died before the sixth year of age, 16.7 per cent died in each of the age-periods from 6 to 10 years and from 11 to 15 years; in each of the next two age-periods, 8.3 per cent died; and 16.7 per cent in the age-period 31 to 35 years. After 46 years of age 8.3. per cent died.

Table 18 exhibits the numbers of males and females who died from measles in the year 1893, of which the ages were stated, in each year of age up to 30 years, and from that age to 65, the per cent of deaths in certain age-periods, and the average age at death of each sex and of both sexes.

The average age at death from measles in 1893 was 11.2 years for males, 19.2 years for females, and 15.5 years for both sexes.

### AVERAGE DURATION OF MEASLES.—FATAL AND NON-FATAL CASES.

TABLE 19.—*Exhibiting by Sex of patient, the duration (in days) of fatal cases of sickness from Measles, in Michigan during the year 1893. Arranged in five-day groups, the first and last days in each group are included. (Compiled from those reports which stated the length of time the patient was sick.)*

| Fatal cases of Measles. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | No. of cases included. | Duration of sickness:—Per cent of Deaths in each Period of days. | | | | | | |
| | | | All cases. | 0 to 5. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. |
| 1893. | Males | 9 | 100 | 44.4 | 22.2 | 22.2 | 11.1 | 0 | 0 |
| | Females | 11 | 100 | 9.1 | 27.2 | 27.2 | 18.1 | 9 1 | 9.1 |

Table 19 shows that of the 9 males reported to have died from measles in the year 1893, of which the interval between the day of being taken sick and the day of death was given, 4.4 per cent died before the sixth day of sickness, and 88.8 per cent died before the sixteenth day of sickness.

Of the females so reported only 9.1 died beforet he sixth day of sickness, and 63.5 per cent died before the sixteenth day of sickness. 25 per cent more females than males died after the fifteenth day of sickness, and while there were no cases of males reported to have died after the twentieth day of sickness, 9.1 per cent of female decedents died after being sick from 21 to 25 days and 9.1 per cent died after being sick from 26 to 30 days.

The average duration of fatal cases of measles in 1893 was 7.9 days for males, 13.1 days for females, and 11 days for both sexes.

Table 20 shows that of the 620 males who recovered from measles in 1893, of which the interval between the day of being taken sick and the day of recovery was stated, 12.1 per cent recovered before the sixth day of sickness, 45 per cent were sick from 6 to 10 days, 25.3 per cent were sick from 11 to 15 days and 17.8 per cent recovered after the fifteenth day of sickness.

Of the 654 females reported sick in the same time, 13.9 per cent recovered before the sixth day of sickness, 49.7 per cent were sick from 6 to 10 days, 22.2 per cent were sick from 11 to 15 days and 14.3 per cent recovered after the fifteenth day of sickness.

The average duration of non-fatal cases of measles in 1893, was 11.4 days for males, 10.4 days for females, and 10.9 days for both sexes.

TABLE 20.—*Exhibiting by Sex of patient, by per cent of cases which recovered in specified periods of time, the duration (in days) of Non-fatal cases of sickness from Measles in Michigan, during the year 1893. Arranged in five-day groups; the first and last days in each group are included. (Compiled from those reports which stated the length of time the patient was sick.)*

| Non-Fatal Cases of Measles. | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year. | Sex. | No. of cases included. | Duration of Sickness:—Per Cent of Cases in each Period of Days. | | | | | | | | | | | | |
| | | | All Periods. | 0 to 5 days. | 6 to 10. | 11 to 15. | 16 to 20. | 21 to 25. | 26 to 30. | 31 to 35. | 36 to 40. | 41 to 45. | 46 to 50. | 51 to 55. | 56 days and over. |
| 1893. | Males | 620 | 100 | 12.1 | 45.0 | 25.3 | 9.7 | 3.5 | 1.6 | 1.0 | 1.0 | .2 | .2 | .3 | .3 |
| | Females | 654 | 100 | 13.9 | 49.7 | 22.2 | 7.5 | 2.8 | 1.9 | .2 | .9 | .3 | .5 | 0 | .2 |

TABLE 21.—*Measles in Michigan during the year 1893, exhibiting, by months, the per cent of all weekly card-reports received which stated the presence of measles; the average per cent of all observers reporting weekly who reported measles; the average order of prevalence of measles where it was present; the prevalence* of measles and the number of outbreaks of measles reported by health officers and clerks of local boards of health.*

| 1893. | Year. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Per cent of weekly card reports stating presence of measles | 7 | 10 | 12 | 10 | 11 | 17 | 13 | 8 | 3 | 2 | 1 | 2 | 2 |
| Average per cent of observers who reported measles present | 14 | 18 | 23 | 21 | 20 | 33 | 21 | 17 | 6 | 2 | 2 | 3 | 3 |
| Average order of prevalence where present | 2.8 | 3.3 | 2.4 | 2.4 | 2.4 | 2.6 | 2.2 | 2.9 | 5.6 | 3.3 | 4.0 | 3.5 | 5.3 |
| Prevalence* | 7 | 6 | 3 | 5 | 4 | 1 | 2 | 7 | 11 | 8 | 10 | 9 | 12 |
| Outbreaks† | 320 | 62 | 40 | 29 | 37 | 36 | 49 | 21 | 8 | 5 | 6 | 8 | 19 |

* Explained in the text accompanying this table.

† The numbers in this line show the numbers of outbreaks which *began* in each month. There were 45 reported outbreaks in this year the dates of which were not given.

### PROPORTION OF MEASLES IN THE DIFFERENT MONTHS OF THE YEAR 1893.

Table 21 exhibits the proportion of measles reported in each month of the year 1893. The *first* line gives the per cent of all weekly postal-card *reports*, made by physicians in active general practice, which reported the presence of measles under their observation. The *second* line gives the average per cent of all these *reporters* who stated the presence of measles. The *third* line states the average order of prevalence of measles in the list of diseases reported. The *fourth* line represents the *prevalence* of measles, being a combination of the first and third lines of this table (the method of combining them is explained on pages 122–3 of the Annual Report of this Board for the year 1890). In this fourth line the smallest numbers indicate the greatest prevalence,—for instance, May is 1 or *first* in prevalence,—more measles in May than in any other month; June is 2 or *second* in prevalence; February is 3 or *third* in prevalence; and so on. The *fifth* line represents by months the number of outbreaks of measles reported to this office by health officers and clerks, including only the reports which gave the dates of outbreaks,—reports of 45 outbreaks did not give dates and, of course, those outbreaks could not be included in this line.

The evidence in the first four lines of this table (21) seems to indicate that the maximum prevalence of measles in Michigan occurred in May and the minimum in December, whereas the fifth line of the table shows the maximum number of reported outbreaks occurred in January and the minimum in September. But this evidence is only for a single year, and might, therefore, be exceptional. In Exhibit XX., page 137, of this Annual Report for 1894, is a statement of the average per cent of weekly card reports stating the presence of measles by months for the sixteen years, 1877–92, from which it appears that the maximum occurs in May, and the minimum in September and October.

# WHOOPING-COUGH IN MICHIGAN DURING THE YEAR ENDING DECEMBER 31, 1893.

During the year ending December 31, 1893, 4,047 cases of sickness and 134 deaths from whooping-cough in Michigan, were reported to the Secretary of the State Board of Health. This disease was reported to have been present during the year in 214 localities with an average of 18.9 cases and about .63 of one death per locality. The death-rate from this disease for the State, in 1893, according to the reports, was .6 of one death per 10,000 inhabitants.

From fifteen* of the above-mentioned 214 localities, 83 deaths were reported, whereas the number of *cases* which occurred in those localities was not reported. Assuming that in those fifteen localities the ratio of cases and deaths was the same as in localities from which both cases and deaths were reported (1.3 per cent), we may reasonably conclude that there probably occurred 6,451 more cases in the State than were reported, making a total of 10,415; and that the ratio of deaths to cases was 1.3 per cent.

It is quite possible that not all, even of the fatal cases, were reported, so that there may have been, and probably were more than the 10,415 cases in Michigan in 1893.

## SOURCE OF CONTAGIUM.

Relative to the source of contagium of whooping-cough, it was reported in 28 instances as from a preceding case, in 5 instances as "epidemic," in 51 instances as "unknown," in two instances as "contagium," in 3 instances as "contracted at school," in 4 instances as "imported," in two instances as "exposure," in single instances as "on cars," "sporadic," and in 117 instances no statement was made relative to it.

Whooping-cough in this State is a disease of considerable importance, and one in regard to the danger of which, up to the present time, there seems to have existed great ignorance among the people, and gross neglect in its restriction and prevention. The greater part of the correspondence relating to whooping-cough, which has been received at this office during the year 1893, and in preceding years, consists in inquiries as to whether the disease is of sufficient importance to be reported, and whether isolation of cases of it was necessary. In most instances there had been no attempt at restriction. Only six reports stated that isolation of those sick of this disease had been enforced in 1893.

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* Localities from which deaths only were reported, were as follows:—

| | |
|---|---|
| Springwells Tp., Wayne Co. | 3 |
| Battle Creek city, Calhoun Co. | 2 |
| Moffatt Tp., Arenac Co. | 1 |
| Osceola Tp., Houghton Co. | 2 |
| Quincy Tp., Houghton Co. | 1 |
| Calumet Tp., Houghton Co. | 8 |
| Hinton Tp., Mecosta Co. | 1 |
| Bedford Tp., Monroe Co. | 1 |
| Ash Tp., Monroe Co. | 2 |
| Holland City, Ottawa Co. | 1 |
| Higgins Tp., Roscommon Co. | 1 |
| Saginaw City, E. S. | 1 |
| Cato Tp., Montcalm Co. | 4 |
| Inland Tp., Benzie Co. | 1 |
| Detroit city | 54 |
| Total | 83 |

The deaths caused by this disease (134 in 1893), should make it of equal importance with measles (of much greater importance than small-pox), as a life destroyer; and the great numbers of non-fatal cases of the disease, many of which leave severe secondary conditions or injuries for life, indicate that much good can be accomplished by restricting the disease. As mentioned in former reports, " there seems to exist a very common feeling that whooping-cough is an infantile disease, which all children must sooner or later contract, and that it is not a very fatal disease."

This feeling is due to a misconception of facts relative to this disease. In Michigan whooping-cough is about as fatal as measles, causes many more deaths than does small-pox, is an infectious disease, which, by the adoption of the measures recommended by this Board, is preventable, and the disease is much more prevalent and fatal in *children under five years of age* than in older persons, therefore, the longer we can shield children from this malady the less liable they are to contract it, and the more likely they are to recover from it if the disease is contracted.

As above stated, of the 214 reports made to this office relative to whooping-cough during the year 1893, only six stated that restrictive measures had been employed. The localities from which it was thus reported were: Barry township, Homer village, Nadeau township, Spring Lake village, Trenton village, and Saranac village. From these six localities a total of sixteen cases of the disease was reported—an average of 2.7 cases per locality—whereas, the average reported cases from other places was 18.9 per locality. It is reasonable to assume that had restrictive measures not been adopted in the six localities above-mentioned, the number of cases in each of those localities would have equalled the average for all localities from which reports were received, and that the total of cases there would have been 113 instead of 16. It is probable, also, that if restrictive measures had been resorted to in all the localities where the disease was reported present during the year, the number of cases in each locality would have been limited to 2.7 per locality, the same as in those six localities above mentioned. This would have effected a saving of 16.2 cases per locality, or 3,467 of the 4,047 cases reported to have occurred in the State during the year.

Knowing the distressing paroxysms of coughing suffered by children who have this disease, do not common humane emotions demand strenuous efforts on the part of those concerned to prevent such misery among the thousands of persons now permitted to suffer? Yet, although the disease is easily preventable, parents and health officials seem to neglect even ordinary precautions to avoid it; and thousands of children are annually allowed, unnecessarily to suffer, and hundreds to die or be ruined for life by it, who might live to be a comfort to their friends and to become useful citizens of the State.

## SMALL-POX (VARIOLA) IN MICHIGAN IN 1893.

During the year 1893, two outbreaks of small-pox in Michigan were reported to the Secretary of this Board. One of these outbreaks, in Springport township, Jackson county, was confined to one non-fatal case of the disease. The other outbreak, in Pittsfield township, Washtenaw county, resulted in nine cases of which three proved fatal.

The three deaths from small-pox in Michigan in 1893 are precisely the same number as the average per year for the ten years ending with 1893. This is shown in Table 2, further on.

Following are extracts from correspondence of this office which give details relative to the above-mentioned outbreaks of small-pox:—

### *Small-pox in Springport Township, Jackson County.*

Relative to this outbreak, the health officer of the township of Springport, J. B. Judson, M. D., wrote to this Office, Jan. 14, 1893, as follows:—

"We have two people within my jurisdiction who have been exposed to small-pox. We have them isolated about two miles out in the country. It is reported to me this A. M. that one of them was beginning to show some evidence of the disease. I am not called on to treat the parties. Now then, is it my duty, in the capacity of health officer, to visit the cases, thus perhaps being the means of spreading the disease? I think not. Please inform me."

In reply to Dr. Judson's letter the Secretary wrote, Jan. 16, 1893:—

"In response to your question,—'Is it my duty, in the capacity of health officer, to visit the cases?' etc. The law—section 1, of Act 137, Laws of 1883—requires the health officer, when he shall have received reliable notice or shall otherwise have good reason to believe that small-pox or any other disease dangerous to the public health is present in his jurisdiction, 'immediately to investigate the subject' and perform other duties as set forth in that Act. It may not be necessary for you 'to visit the cases' (you may probably see the case through the window if you choose and they bring it near), but you should visit the premises and see that your orders as to isolation of the sick and *infected* are being obeyed, and that 'no person suffers for lack of nurses or other necessaries because of isolation for the public good.' You are required 'to order the prompt vaccination or isolation of persons who have been exposed to small-pox.'"

Jan. 15, 1893, Dr. Judson again wrote, as follows, to the Secretary of this Board:—

"We have one case of small-pox, light, so reported, and another that has been exposed. We have isolated both cases about two miles out in the country, posted notices (5) on and around the house, and are taking all precautions to keep the disease from spreading. The particulars are as follows: Two of our young people were married Dec. 29, 1892, and went the next day (Friday) on their wedding trip to Akron, Ohio, where they had relatives living. The man at whose house they visited was ailing when they arrived and soon after sent for a physician who pronounced his ailment small-pox. They came home the next day (Saturday) and our board immediately isolated the parties and have taken all necessary precautions to prevent a spread. It was reported to me yesterday morning that the lady was slightly ailing, with some eruption appearing; but was not much sick. The young man as yet shows no signs of infection.

"I shall be very glad to have you give me any instructions you may consider necessary for my guidance in the matter. I will report to you every day or two until we are clear of this trouble."

In reply to this second letter from Dr. Judson, the Secretary wrote, Jan. 17, 1893:—

"Accept thanks for your letter of Jan. 15, relative to small-pox. I wrote to you yesterday relative to the subject, and I think of no other suggestions, at this time, than were made in that letter and are contained in the pamphlet on the restriction of the disease, copies of which went to you yesterday. Thorough and complete isolation of the sick or infected should be procured in every instance, and the vaccination of all exposed and liable to be exposed; also the revaccination of all not vaccinated within five years.

"Trusting that you will succeed in confining the disease to the persons first infected." * * *

January 25, 1893, C. A. Whitman, father-in-law of the patient in this outbreak, wrote to the Secretary of this Board as follows:—

"Our girl is almost through with the small-pox. Scabs all fallen off. Feeling good. My son has not taken it yet. Now I want to ask if, as soon as she is able to come away, if he cannot cleanse himself and come too, as we cannot renovate the house with them there. * * * * Can't we keep him in the family until he shows some signs of the disease? We could leave the rooms where they are until we are satisfied he will not have it. Please give me all the instructions you think necessary."

January 27, 1893, the Secretary wrote as follows in reply to Mr. Whitman's letter:—

"In response to your letter of Jan. 25, relative to small-pox,—I think it would be safe for your son to leave the house now occupied by himself and wife, as soon as she has fully recovered from the disease. Neither of them, however, should leave the house until their persons and clothing have been thoroughly disinfected. The bathing of the person should not be omitted, and special attention should be paid to the hair. If, after he is released from isolation, he should show any symptoms of the disease, he should be promptly isolated again.

"Nothing should be done in any event, except it be done under the direction and immediate supervision of the local health officer.

"It will be safest if no clothing be worn away from the infected premises that has been there,—that is to say, clean, uninfected clothing should be taken there for them to put on when they leave there; and the infected clothing should be disinfected with the premises."

Jan. 31, 1893, Dr. Judson wrote:—

"Our small-pox patient is convalescent. Mr. Whitman does not take the disease as yet. Mrs. Whitman was attacked on the 10th of Jan. Will it be safe to let them *both* out of their isolation by Friday or Saturday Feb. 3d or 4th? which makes 27 or 28 days since Mrs. Whitman was first attacked. Do you apprehend any danger of Mr. Whitman developing the disease after 23 days? The parties of course are in a hurry to get out of their confinement; but we have controlled it so far and want to be reasonably safe before letting up on their isolation.

"Doctor, have you a reliable man that you can send to us at our expense to fumigate and disinfect this house? If you think it safe to let them out on the date I have mentioned we wish to disinfect next Saturday.

"Please write and post me on all of the above by return mail, and if you can send us a man about what he would charge. The R. R. fare is $1.50, round trip. He would be obliged to stay until Monday."

Feb. 2, 1893, the Secretary replied to Dr. Judson's letter as follows:—

"In reply to your letter of January 31, just received,—no definite time from the *beginning* of the disease can be specified when it would be safe to release a patient from isolation, after disinfection because the periods of infectiousness differ in different cases. The patient should be kept isolated until desquamation has entirely ceased, and all scabs have disappeared from the body, and all sores about the mouth, nose, eyes, ears, and all other parts of the body have healed. Then when the hair is thoroughly disinfected the body thoroughly washed, and the clothing replaced by uninfected clothing, it is considered safe to release from isolation.

"I am unable to send anyone from here to aid you in the disinfection, nor do I think of anyone near you whom I could recommend as unusually well-qualified for that particular work. But from what I have written, and from the enclosed pamphlets I think you will be able to obtain sufficient information to enable you to do the work thoroughly and satisfactorily."

Feb. 14, 1893, Dr. Judson wrote, finally, to this office as follows:—

> "You may find some discrepancy between this report and a previous one, inasmuch as it was reported to me that this patient was attacked with small-pox on Jan. 13, and I so reported to you; but it appears she was taken sick on the 10th of January.
>
> "The man, Mr. Whitman, did not take the disease at Akron, nor of his wife, and he nursed her all through, taking the entire care of her from first to last; and I attribute his escape to the fact that he was successfully vaccinated about three years ago, and revaccinated immediately after exposure, which again took, and he has escaped so far. His wife had not been successfully vaccinated until after exposure, and became infected. Very good evidence that vaccination protects."

Even though Mrs. Whitman was not vaccinated until after exposure, yet the vaccination seems to have made the disease very much less severe than it is when unmodified by vaccination.

### *Small-Pox in Pittsfield Township, Washtenaw County.*

Nov. 26, 1892, notice was received at this office of the arrival at New York (on Nov. 23), per small-pox-infected steamship "Saale," from Bremen, of 34 immigrants destined for the following places in Michigan:—Ann Arbor, Hancock, Detroit, Carleton, Alpena and Bay City. As is usual in such cases, the health officers of the above-named places were immediately notified by this office, of the probable arrival of these immigrants in their jurisdictions. The immigrants destined for Ann Arbor,—Herman Jager, wife and four children—instead of going to Ann Arbor, as was expected, left the train at a place where the local health officer had no notice of their having been exposed to small-pox, namely, at Pittsfield Junction (Toledo & Ann Arbor R. R.), a few miles south of Ann Arbor.

Jan. 22, 1893, C. F. Unterkircher, M. D., health officer of the village, Saline, wrote to this office as follows:

> "I wish you would send me at once by mail 80 good fresh vaccine points, and I will remit the money. I have to inform you that the family of Henry Schneider, in Pittsfield township, is down with confluent small-pox. It was brought here by Herman Jager and family who arrived here about two months ago, and lives with the Schneider family. This family came here direct from Germany, and were probably exposed somewhere on the way. Herman Jager had a very mild Varioloid, which was at first taken for chicken-pox, as the disease has been very extensively about here in a very mild form. Four of the Schneider family are down with the disease. None of the Jager family have had any symptoms of the disease except the father as mentioned above. I treated these people a couple of days, until yesterday, with other physicians, when I surrendered them into other hands on account of not feeling well (sick). Due precautions have been taken, house placarded, etc. One girl of about 14, and a child of about 2 years are in a very precarious condition. It has been reported, I understand, in the Detroit Tribune, although I did not see the paper myself, that health officers at New York had notified Dr. Duffield, of Detroit, that a man by the name of Herman Yager and family had been shipped towards Detroit in a roundabout way by the railroads, who had been exposed to variola."

On receipt of Dr. Unterkircher's letter, the Secretary of this Board immediately notified M. F. Case, health officer of Pittsfield township, that small-pox was reported present in his jurisdiction. At the same time (Jan. 24) the Secretary wrote to Dr. Unterkircher informing him that this Board had no vaccine points; but that he (the Secretary) had telegraphed to Dr. Charles N. Hewitt, Secretary of the State Board of Health of Minnesota to send Dr. Unterkircher eighty points. Pamphlet publications of this Board on the restriction of small-pox, were sent to Dr. Unterkircher, for distribution where they would be likely to be of most use.

Jan. 23, 1893, Mr. Case, health officer of Pittsfield township, wrote to this office as follows:—

"I was notified yesterday of an outbreak of small-pox in my township (Pittsfield), Washtenaw county. It was brought here by an immigrant and family—wife and 5 children—They got off the train at Pittsfield Junction—Toledo & Ann Arbor road, went to live with a relative named Schneider who has a wife and five children. Schneider's wife and four children are now sick. The Doctor says 2 children will die. Every precaution has been taken to prevent the spread of the disease. The house is near the road; but some 40 rods from any other dwelling. I have not as yet learned all the particulars; but will write you more fully should you desire to know."

Jan. 26, 1893, Mr. Case again wrote:—

"In reply to your request to be kept fully informed in regard to the progress of the outbreak of small-pox in this township, I will say that last Sunday a 3 year old child died and was immediately buried on the grounds by the father and emigrant Jager. A 13 year old that the Dr. (Georg of Ann Arbor) thought last Sunday could not possible live is still alive. Schneider's wife is very sick; also a boy 4 years old. These three as near as I can learn are all that are sick at present. Herm. Jager the emigrant and family are all well. Schneider is a man who spends his money for whisky, so that now this calamity coming on his family they are destitute. This with the addition of Jager's family of 6, making 12 to provide for keeps me very busy. All this work I see to personally. I have closed all highways leading to the house, and have engaged Dr. Chandler of Saline to go from house to house vaccinating all the people free of charge, so that by tomorrow night this work will be thoroughly accomplished on all residing any where near the outbreak. The Board of Health will extend this work all over the township, and I believe it would be a grand thing for every township and city in the State to do the same.

"Dr. Georg of Ann Arbor, has charge of the patients. He visits them every day, and I believe is doing all that can be done. I cannot see him very often, as his visits and mine to look after their needs, occur different times of the day. I cannot enter the house, and have to learn of their condition as well as I can from Schneider who is an ignorant German, and from letters Dr. Georg sends; but will do the best I can to keep you posted. Dr. Georg can tell you all, and I will ask him to do so."

Jan. 28, 1893, the Secretary wrote as follows to Mr. Case:—

"I am pleased to learn of the vigorous measures instituted by you and your board of health to arrest the further spread of the disease, and I trust that they will be continued until the disease is 'stamped out.' Your letter does not state just how many cases have been *reported* as sick. The newspapers say that not all have been reported to this Office. Perhaps the newspaper men count the twelve which you have isolated, as being all sick? whereas I understand from this letter of yours that only three are sick."

In reply, Mr. Case wrote, Feb. 2, 1893:—

"I think it has been about a week since I wrote you in regard to the small-pox. I try to keep the clerk of our board posted and depend on him to send you the weekly reports.

"Schneider, his wife and 6 children lived in a small log house when emigrant Jager, his wife and 4 children moved in, making in all 14 people in the house. Jager is the only one of his family who has been sick. He gave the disease to the Schneider family. Schneider and 2 children have been sick and recovered. His wife, a daughter 9 years, and a child 7 months old are now very sick. A daughter 3 years old was buried Jan. 24, and yesterday, Feb. 1, we buried a daughter 13 years old. The Dr. thinks the chances favorable for the recovery of those now sick.

"Dr. Georg of Ann Arbor attended the family about a week when he was taken sick, having all the first symptoms of the disease, and was compelled to give up the job. I then secured the services of Dr. McLaughlin of Moreville. He is attending it faithfully and has had quite a little experience with the disease. For any particulars that I cannot give please address him. I have heard of no sickness as yet from others being exposed; and believe we shall be able to keep it confined where it now is.

"Here in the country our board of health is scattered. Fortunately the outbreak occurred about a mile from my place where I can look after it. This I do, supplying them with all that is needed, and seeing that their dead is buried. I attend to it all personally. In fact am compelled to as the people are all afraid to go any where near the place. It keeps me very busy; but I hope that I may be able to keep about until the thing is ended."

In his final report of this outbreak, sent to this Office April 1, 1893, Mr. Case stated that in this one house, to which the disease had been confined, there had occurred nine cases and three deaths.

### *Small-pox in Michigan in 1893 Compared with Previous Years.*

The following Table (1), shows the numbers of cases of sickness and of deaths from small-pox which have been reported to this office during the ten years 1884-93; and the number of localities in the State in which this disease has been reported present in each of those years.

TABLE 1.—*Exhibiting for each of the Ten years 1884-93, the number of reported Cases of and Deaths from Small-pox in Michigan; and the number of localities where the disease was present. Compiled in the Office of the Secretary of the State Board of Health, from reports made by local health officers.*

| Years. | No. of localities. | Cases. | Deaths. |
|---|---|---|---|
| 1884 | 5 | 22 | 3 |
| 1885 | 9 | 27 | 6 |
| 1886 | 4 | 24 | 7 |
| 1887 | 2 | 4 | 0 |
| 1888 | 11 | 42 | 6 |
| 1889 | 14 | 57 | 4 |
| 1890 | 2 | 2 | 0 |
| 1891 | 3 | 3 | 0 |
| 1892 | 1 | 1 | 1 |
| 1893 | 2 | 10 | 3 |
| Total Ten Years | 53 | 192 | 30 |

### *Insufficient Quarantine of Immigrants.*

The following bearing on outbreaks of small-pox in this and other States during the year 1893, tends to show that the quarantine of immigrants arriving at the port of New York, is insufficient and unsatisfactory:—

May 22, 1893, Dr. Howard Carey, health officer of Sand Beach village, Huron county, wrote to this office as follows, relative to immigrants of whose probable arrival in his jurisdiction he had been advised by this office:—

"The immigrants from New York who were on vessel with the case of small-pox, arrived here on Monday (18 of them). They appear all right. We are keeping a sharp look after them. Why were they allowed to leave New York so soon? They say they were only detained two days on the island, and then allowed to come on. Therefore it is not 14 days until Thursday since they landed. I should have thought they would have been kept the necessary number of days in quarantine to prevent any of them coming down with the disease. Suppose they had been exposed to contagium on the last day on board they might not be taken down yet. Also they say positively their baggage was in their possession all the time while in the port at New York, therefore how could it have been disinfected? I fail to see from my understanding of the case how the New York authorities did their duty in this case."

The immigrants referred to in Dr. Carey's letter, arrived at the port of New York May 11, 1893, per small-pox-infected steamship "Gera."

The following notice was issued from this Office Jan. 24, 1893, for the information of health officers and others:—

> "*Small-Pox in Pittsfield, near Ann Arbor, Michigan.*
>
> "November 26, 1892, the Secretary of the State Board of Health notified Dr. John Kapp, health officer of the city of Ann Arbor, that Herman Sager, his wife and 4 children, immigrants from Bremen, on the steam ship 'Saale' on which a case of small-pox had developed during the voyage, were destined for Ann Arbor. This morning Secretary Baker received notice from Dr. Unterkircher, health officer of the village of Saline, that four persons, in the family of Henry Schneider of Pittsfield township just south of Ann Arbor, are sick with small-pox, and that the disease was brought by Herman Jager and family, who arrived there about two months ago and lived with the Schneider family; also that Herman Jager had a mild case of varioloid which was at first taken for chicken-pox, as that disease was at that time prevailing. Notice was received of two outbreaks of small-pox, in Ohio, caused by immigrants from that same vessel—the 'Saale.' These three outbreaks of this disease came by immigrants through the New York quarantine, as did also the small-pox recently reported from Iowa, which came on the ship 'Zolar.'
>
> "All this is not encouraging with reference to the cholera."

In addition to the instances above cited, three outbreaks of small-pox in the province of Ontario, and one in Manitoba, were reported to this office (by interstate notification) to have been due to contagium carried by immigrants from infected vessels.

### *Interstate Notifications of Small-Pox.*

In accordance with an agreement entered into at the International Conference of State and Provincial Boards of Health, held at Toronto, Oct. 6, 1886, notices were sent from, and received at, this Office during the year 1893 of the presence of small-pox in the following States and Provinces:—

Michigan.—Springport township, Jackson county, 1 case; Pittsfield township, Washtenaw county, 9 cases and 3 deaths; Connecticut.—New Haven, 18 cases; Delaware.—Wilmington, New Castle county, 1 case; Indiana.—Muncie, 150 cases and 20 deaths; Dunkirk, Jay county, 8 cases and 1 death; Connorsville, Fayette county, 1 case; Luray, Henry county, 1 case; Marion, Grant county, 1 case; Indianapolis, 1 case; Elwood, 3 cases; Alexandria, 10 cases; New Albany, Floyd county, 1 case; Franklin, Johnson county, 2 cases (varioloid); Illinois.—Chicago, 107 cases; New Memphis, Clinton county, 4 cases; Iowa.—Cumberland, 5 cases; Burlington, 1 case; Louisiana.—New Orleans, 1 case; Maine.—Portland, 1 case; Deering, Cumberland county, 2 cases (varioloid); Minnesota.—Featherstone, Goodhue county, 1 case; New Jersey.—Red Bank, 1 case; New York.—Islip, 2 cases and 2 deaths; Warwick, 1 case; Greenburgh, 1 case; White Plains, 1 case; Ohio.—Akron, 52 cases and 13 deaths; German township, Darke county, 5 cases; Ft. Recovery, Mercer county, 1 case; Mansfield, 12 cases; Wadsworth, Medina county, 1 case; Norwood, 1 case; Pennsylvania.—Berks county, 678 cases and 18 deaths; Philadelphia, 4 cases; Tennessee.—Chattanooga, Hamilton county, 1 case; Wisconsin.—Milwaukee, 1 case; West Virginia.—Bridgeport, Harrison county, 1 case; Canada.—Manitoba, 2 cases and 2 deaths; Ontario.—Pt. Arthur, Algoma county, 1 case; Hamilton, Wentworth county, 1 case; Toronto, York county, 1 case; Hope Tp., Durham county, 1 case.

Jan. 19, 1893, Dr. J. H. Carpenter, of Clare city, wrote to the Secretary of this Board as follows relative to the possible introduction of small-pox into this State from the State of Indiana:—

"Since the natural gas excitement at Alexandria, Indiana, there is quite a colony from this place gone there and it is now reported here that they have small-pox very bad there, and one man has returned here to await results, and others are making preparations to move their families back. I am informed that the authorities of Alexandria are very lax about keeping the cases isolated and that members of families who are not themselves sick are allowed to go in public, although other members of the same family are sick in the house with small-pox. Saturday the 17th I asked the Mayor to call the council together as a board of health and take means to prevent the return here of families from the infected city. He said he would do so at once, but so far he has not made a move. If the reports are true (and I have it from a returned man) and they are allowed to return, an epidemic of small-pox will be almost inevitable."

On receipt of Dr. Carpenter's letter, the Secretary wrote to him (June 20, 1893):—

"Please accept thanks for your letter of June 19, in which you state that persons are returning from Alexandria, Ind., where small-pox now exists, and are liable to bring the disease to Clare.

"I send you by this mail 50 copies of the leaflet 'Now is a Good Time to be Vaccinated,' which I earnestly wish to distribute, in Clare at this time.

"Herewith I send you a copy of the pamphlet on the Work of Health Officers and Local Boards of Health in which I have marked that part to call your attention to the fact that the local board of health should make and publish rules. Will you have the kindness to show it to the mayor or the president of your board of health?"

### *Vaccination.*

The outbreak of small-pox which occurred in Springport in January, 1893, seems to illustrate the efficacy of vaccination in giving immunity from this disease.

Briefly stated, the circumstances attending this outbreak were:—A man and wife were exposed to small-pox. The woman contracted the disease. The man, besides having been exposed at the same time his wife was, attended her all through her sickness, but did not have the small-pox. The woman had not been vaccinated until after exposure. The man had been successfully vaccinated four years previous to exposure, and again immediately after exposure.

The rarity of small-pox in Michigan for several years has led to a feeling of security, and it is feared, to neglect of vaccination, resulting in an increased proportion of inhabitants who are not protected by recent vaccination. This might make possible a widespread epidemic, if small-pox should enter the State in such a manner that exposure to it should be general, as is favored by improved facilities for general and rapid travel through and about the State.

Following are extracts from the correspondence of this Office bearing on this subject:

Jan. 28, 1893, S. J. Smith, health officer of Fair Grove township, Tuscola county, wrote to the Secretary of this Board as follows:

"I desire to call your attention to the matter of vaccination. The law, as viewed by the Board in my jurisdiction, is inoperative, or nearly so. When I last brought the matter before the Board, the law was construed to mean that an offer to vaccinate filled the law's requirements. The result was but five persons were vaccinated that year. Notices, in County paper, and handbills were employed, and time and places appointed to do the work; but none responded. There are not less than 400 persons in this township unvaccinated. The law is not compulsory; but the question with me is, should the Board visit the families, and thus secure an almost universal compliance with the evident design of the law. The cost would be greater, but the end would be better secured, and the youth and people generally receive immunity from the disease, which is now almost a nullity, so far as this jurisdiction is concerned. If this is the case in other townships would it not be well to ask for an amendment of the law?

"If this Board has improperly construed the law, would it not be proper that a circular should issue from the State Board explanatory of the law?

"Experience has shown that the people are slow to comply with the requirements of the health laws and even health boards are not always ready to aid in sanitary reform."

In reply to Dr. Smith's letter, the Secretary wrote, Jan. 31, as follows:—

"In some localities in this State, boards of health *do* send physicians around to the homes to offer free vaccination to the people. This has just been done at Pittsfield, Michigan. I think that it is the best way to induce people to be vaccinated."

Relative to this subject, Dr. D. P. McLachlan, of York, Washtenaw county, wrote to the Secretary of this Board as follows, Jan. 31, 1893:—

"Is it not possible to have a bill passed by the Legislature at its present session making vaccination compulsory? Will you draft such a bill and have it introduced?

"I do not know just how to get at the matter, but would offer a few suggestions.

"I would make it the duty of every board of health in the State to annually offer free vaccination to every person in their jurisdictions who has not been successfully vaccinated. They now have that power but I would make it *obligatory* on them to do so and make the neglect or refusal to do so punishable by a fine.

"I would also make every parent or guardian who neglects or refuses to allow his child or ward to be vaccinated, subject to a fine of not less than $5.00 or ten days imprisonment in the county jail for each and every offense. I would also prohibit every child unvaccinated, from attending school.

"This of course is very crude, but I would get at it in about that manner. If you will have such a bill introduced and send me a copy, I will try and influence our senator and representative to support such a measure."

Feb. 6, 1893, the Secretary replied to Dr. McLachlan's letter as follows;—

"Please accept thanks for your letter of January 31, relative to small-pox in Pittsfield and a compulsory vaccination bill.

"I would favor a bill compelling the offering of free vaccination in each locality, but I do not favor compelling persons to be vaccinated. Possibly that may be best under a monarchical form of government, but I think not in a republic like ours. When vaccination is made free, to all persons, each person can protect himself, and, therefore, *A* scarcely has good ground for compelling his neighbor *B* to be vaccinated in order to protect *A* from small-pox.

"Relative to my drawing a bill, I already have undertaken to prepare a number of bills relating to the public health, which will take all the time I shall be able to give to that work. The press of work here is unusually great.

## CHICKEN-POX (VARICELLA) IN MICHIGAN IN 1893.

Three outbreaks of this disease, from as many localities in this State, were reported to this office during the year 1893. The following extracts from correspondence of this Office give details relative to these outbreaks:—

### *Varicella in Port Austin Village.*

June 19, 1893, Sarah A. Cole, M. D., health officer of Port Austin village, Huron county, wrote to this Office as follows:—

"Last week we had an outbreak of varicella (chicken-pox). I have isolated the patient and forbade the other children going to school. I hope there will be no further outbreak or spread of the disease. Is it necessary to put up a card for the isolation of varicella?"

In reply to Dr. Cole's letter, the Secretary of this Board wrote, June 20, 1893:—

"Accept thanks for your letter of June 19, relative to German measles and varicella (chicken-pox). It would seem hardly worth the time, to attempt to prevent the spread of varicella, by way of isolation and placarding.* The number of deaths from varicella, reported to the Secretary of State of the State of Michigan, for the six years, 1884–1889, is 11, an average of less than two deaths per year. The number of deaths from whooping-cough for the same period is 907, an average of 151 per year.

"Nearly every outbreak of small-pox which has occurred in this State within the last ten years was at first supposed to be chicken-pox. Extraordinary care should be used, while dealing with chicken-pox, to be sure you are not dealing with small-pox or varioloid."

### *Supposed Chicken-Pox in Clare City.*

Nov. 10, 1893, a citizen of Clare city wrote to the Secretary of this Board as follows:

"There is an eruptive fever going here that has been thought to be chicken-pox, but from some of the descriptions, I have thought that perhaps it might be varioloid. The patients complain of a great amount of pain in the back, severe headache and sick stomach, in some amounting to vomiting. The eruption appears about the fourth day, and I am told becomes very dark colored. One woman, whose son has been sick about ten days with it, was in last night and she said the scabs had not yet come off; but that they were very dark, in fact black, and where a few were off, she said a brown spot was left. There have been none very sick as yet, and I have not seen any of them after the eruption appeared. My opinion is based entirely upon the reports brought in. Dr. M. D. Davis is the health officer."

On receipt of the above-quoted letter the Secretary wrote as follows to M. D. Davis, M. D., health officer of the city of Clare:—

"I understand that there are a number of cases of chicken-pox in the city of Clare, in some cases the scabs were nearly *black*, and leave a *brown spot* when they come off.

"Enclosed please find a stamped envelope. Will you have the kindness to investigate these cases of chicken-pox, and see if there is not a possibility of varioloid? I should be glad to have your reply as *soon as convenient*, as this outbreak may prove of much interest to this office. Small-pox is reported from adjoining and neighboring States.

"All the outbreaks of small-pox in Michigan for a number of years have, on the start, been called 'chicken-pox.' That is another reason for asking for a prompt and thorough investigation in this instance."

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*[A more humane view is expressed in the text, near the close of this article. H. B. B., Sec. S. B. of H.]

Nov. 14, 1893, Dr. Davis replied as follows to the Secretary's letter:—

"Your communication of 13th received. In reply will say, there was, some time ago, I think about a month, one Mrs. Johnson reported a case of some kind of eruption on a child in a family of five or six children. Upon investigation I found the child had a few sore spots. Some had healed, others little watery blisters. I could see nothing dangerous to public health in it. The child was not sick; was able to be about; but not being able to satisfy the woman, Dr. Sanford, who by the way, has formerly been nurse in small-pox hospitals, investigated the case. He told the woman if she left the child alone it would be all right in a day or two, and so it was. The child (a boy about 7 or 8 years old) was about all the time, and no other cases of the kind have been reported to me.

"You can rest assured that when any contagious disease dangerous to public health breaks out in this city, every means proper to isolate it will be used, and you will be promptly informed. The people of this city one and all are interested in preserving the general health, and we claim to have about as healthy place as the average towns in Northern Michigan."

### *Chicken-Pox in Delta Township.*

Dec. 30, 1893, D. D. F. Brown, M. D., of Grand Ledge, reported to this Office a case of sickness in Delta township, from an eruptive disease which, in the first stage, he was in doubt whether to diagnose as an aggravated case of varicella or a case of varioloid. Relative to this case, Dr. Brown wrote:—

"I have just been called to a case of eruptive disease that I am in much doubt as to its real character. Case female, about 17 years of age. Taken ill on Tuesday last. Eruption pustular, occuring on Wednesday on face as well as body. Saw the case this afternoon for the first time, four or five days after the initial stage. There is considerable soreness of the fauces. Temperature 101. Patient has been vaccinated. The question I am in doubt about is, whether it is an aggravated case of varicella, or a case of varioloid, or something else. The case is just in Delta township, and outside this jurisdiction, and there is no physician as health officer in that township. The case is about one mile distant from here."

On receipt of Dr. Brown's letter the usual letter of inquiry relative to small-pox was sent to the health officer of Delta township who, Jan. 8, 1894, replied as follows:—

"Yours of recent date received, and after thorough investigation by the local board of health, we find that the case of varioloid reported as existing in Delta by Dr. Brown of Grand Ledge, is nothing more nor less than a case of the common '*chicken-pox*.'"

Jan. 4, 1894, Dr. Brown again wrote to this Office:—

"The case I was in some doubt about proved to be, as thought, varicella. I have always believed in being on the safe side in regard to cases of contagious diseases where the diagnosis is difficult at first, and when not the health officer in the jurisdiction or otherwise, report or take some steps to supervision of the same. Having been the health officer for the township of Eagle more than 10 years, and of this city for three years previous to the last, has given no doubt, the same knowledge to your Office of extreme caution on my part on the outbreak of any contagious disease.

"Practitioners may not in a lifetime meet with any case of varioloid, and not having in mind the pathognomonic symptoms might, as a matter of course be unnecessarily alarmed. I trust in the future should I meet with anything of very doubtful character, that upon notification of your Office, that you will, if possible, render me assistance in diagnosing properly. I would say further in regard to this case, that the eruption was not umbilicated and promptly disappeared, and the patient well next day or two."

As stated in the Secretary's letter, quoted near the beginning of this article, very few deaths occur in this State from chicken-pox, compared with other communicable diseases which the people generally do not attempt to restrict. Nevertheless, precious lives may be lost from chicken-pox which might be saved by sufficient general effort, therefore in all cases of this disease, prompt action on the part of health officers, attending physicians, and all others concerned, should be taken to isolate all such cases.

Owing to the rarity of small-pox in this State for a number of years past, many medical practitioners in the State have never seen a case of that disease, and the result has been that a very large percentage of the few cases that have occurred, have been mistaken for, and reported to this Office as, chicken-pox. In the instance mentioned above, the attending physician, being in doubt as to the correct diagnosis of the case, wisely adopted restrictive measures, which, had the disease proved to be small-pox, would, undoubtedly, have prevented its spread. It would be well for all health officers and attending physicians to adopt this method of procedure, and in all doubtful cases give the public safety the benefit of the doubt. In any doubtful case which may be small-pox, every exposed person should be vaccinated.

## CONSUMPTION—IN MICHIGAN DURING THE YEAR 1893.

During the year ending Dec. 31, 1893, the same proportion of weekly card-reports from physicians and health officers stated the presence of consumption as in the previous year (38 per cent), which is a marked decrease from the average for the seven years, 1886–1892. By referring to line 7, of Exhibit IV., of the article on the "Statistical Study of Sickness in Michigan in 1893," on page 91 of this Report, it will be seen that, of 5,853 weekly reports received at this office, from 205 observers in different parts of the State, during the year 1893, 2,224 reports, 38 per cent of the whole, stated the presence of consumption in the localities from which the reports were received. Exhibit IV. also shows the prevalence of the disease in 1893 compared with each of the former years since 1881.

The compilation of the cases and deaths from consumption in Michigan, reported to the Secretary of the State Board of Health, was made for the first time for this article, for the year 1893.

The data for the figures given below were obtained from the annual reports made to this office by health officers and clerks of townships, cities and villages, for the year 1893.

These reports show that during the year there were, by those officers, *estimated* to have occurred 1,988 cases, including 1,509 deaths, from consumption, in 525 localities, in 80 counties, an average of 3.8 cases, 2.9 deaths per locality; 76 per cent of the cases being fatal.

This large proportion of fatal cases under the observation or according to the belief of persons making the reports, can probably be accounted for, by the consumptives, in the early stages of the disease, not consulting a physician or the case not being reported to the health authorities.

The numbers of *recorded* cases (those which were reported to or came under the personal observation of the officers making the reports) were: cases—484, including deaths—419; 86 per cent being fatal cases.

It is evident that very many cases in the early stages of the disease are not reported as yet, and that even most of the fatal cases are not yet reported.

Quite a large number of health officers and clerks stated that the disease was present in their localities but did not state the number of cases.

Many of the reports relative to consumption stated only the number of deaths. For instance, there were deaths from consumption in 1893: in Detroit, 327; in Bay City, 46; Jackson, 50; Lansing, 26; Battle Creek, 18. For these cites, the numbers of cases were not reported.

Below is given a list of a few of the principal localities from which both cases and deaths from consumption were reported:—

| | | | | | |
|---|---|---|---|---|---|
| Grand Rapids | 133 | cases, | including | 121 | deaths. |
| Cheboygan | 30 | " | " | 10 | " |
| Frederic Township | 26 | " | " | 3 | " |
| Iron Mountain | 20 | " | " | 15 | " |
| Escanaba | 12 | " | " | 8 | " |
| Calumet Township | 38 | " | " | 30 | " |
| Kalamazoo | 80 | " | " | 28 | " |
| Muskegon | 20 | " | " | 10 | " |
| Saginaw, E. S. | 30 | " | " | 19 | " |
| Total | 389 | cases, | including | 244 | deaths. |

In these localities where cases and deaths were both reported, 63 per cent were fatal. Although this must be nearer the truth than the 76 per cent, or the 86 per cent mentioned previously, yet this must be much too high.

### *Source of the Disease.*

Relative to the source of the contagium of the disease, it was reported in 15 instances as "from former cases," in 48 instances as "hereditary," in 22 instances as "from taking cold," in 13 instances as "la grippe," in 8 instances as "from exposure," in two instances as "sporadic," in single instances as due to the following causes: "measles," "from marble dust," "in-door work, office," and in 75 instances as "unknown." In the majority of instances no report was made on the question as to source of contagium.

### *Efforts for the Restriction and Prevention of Consumption.*

The work of educating the public regarding this very important disease was continued in 1893, and as in preceding years, printed matter was sent out from this office, stating the ways in which the disease is spread and giving the best methods to be employed for its restriction.

At a meeting of the State Board of Health, held at Lansing Sept. 29 and 30, 1893, the Board, after mature consideration of the subject, decided to include consumption in the list of "Diseases Dangerous to the Public Health," and, in accordance with that decision, passed a resolution consonant therewith. This resolution was printed on slips. A copy of one of these slips is given below:—

## CONSUMPTION IS A DISEASE DANGEROUS TO THE PUBLIC HEALTH.

For many years the Michigan State Board of Health had been laboring for the education of the people of Michigan to a knowledge that consumption is a dangerous communicable disease; and in the Annual Report of this Board for 1892 there was published a copy of a special leaflet issued by the Board in 1891. But it was thought that a formal official declaration that consumption is a "Disease dangerous to the public health," as the phrase is in the law, would attract public attention to the subject; accordingly this was done. The resolution is as follows:—

### RESOLUTION ADOPTED BY THE MICHIGAN STATE BOARD OF HEALTH, SEPT. 30, 1893.

"*Resolved*, That hereafter, consumption (and other diseases due to the *Bacillus tuberculosis*) shall be included in the official list of 'Diseases dangerous to the public health,' referred to in sections 1675 and 1676 Howell's Statutes, requiring notice by householders and physicians to the local health officer, as soon as such disease is recognized."

[In this resolution the question of isolation of the patient is not mentioned. Its purpose is to secure to the local health authorities and to the State Board of Health information of the location of each case of this most dangerous disease, with the view of placing in the hands of the patient, reliable information how to avoid giving the disease to others, and in the hands of those most endangered, information how to avoid contracting this disease. HENRY B. BAKER, *Secretary.*]

The note on this slip explains at least one principal object of the resolution. These slips were sent to all health officers in Michigan, to newspapers and other publications in the State, and to many persons interested in public-health work outside of the State.

### *How this Advance Movement was Received.*

The stand thus taken by the Board received marked attention from sanitarians, the press, and local health officers, and many commendatory letters were received by the Secretary of the Board, regarding the advanced position taken by the Board. Some of these communications are given below.

October 5, 1893, R. W. Corwin, M. D., Member of the Colorado State Board of Health, wrote to the Secretary of this Board, asking for more information relative to the action of the Board, in placing consumption on the list of communicable diseases. His letter and a newspaper article which he enclosed are given below:

"I am greatly interested in the accompanying article. If you have any matter on the subject of this article for circulation, I should greatly appreciate your kindness if you would send the same to me."

The newspaper article read as follows:

#### "CONSUMPTION MADE A DANGEROUS DISEASE IN MICHIGAN.

"*Instructions to be Issued by the State Warning the Public Against Contagion.*

"LANSING, Mich., Sept. 30.—*Special Telegram.*—The Michigan State Board of Health today took an important step in sanitary science by placing the disease consumption on the list of dangerous and communicable diseases, the same as diphtheria and small-pox, and requiring a report of cases to be made to the State board by local boards of health. The board also made a new rule making it practically a criminal offense for immigrants from any infected ports to enter the State of Michigan without permission of the State inspector.

"It has been apparent from the statistics gathered by the State of Michigan during the past twenty-five years that consumption has been the cause of more deaths than any other disease, and reports show this to be equally true of the whole United States. Dr. H. B. Baker, secretary of the Michigan board, has for the past twenty-three years devoted his entire time to public health work, and has carefully scrutinized the statistics with reference to that disease. It has been demonstrated from observations of cases, and by its mode of spreading, that it is a communicable disease, therefore a preventable one. It has also been demonstrated that the disease is not hereditary, and that only a predisposition to the disease can be transmitted from parent to child.

"The disease is the same in animals and man and they mutually infect each other. Animals infect human beings through their flesh and animals are infected through the sputa of human consumption. Apartments previously occupied by consumptives where care has not been taken to destroy the sputa are infected and liable to convey the disease to occupants. Such apartments can be and should be thoroughly disinfected with preventives.

"The disease is not communicable until the breaking down of tissue begins, when it is readily recognized by physicians from the appearance of the sputa under the microscope and by non-professional people by the wasting of the system, the cough, and the matter which the victim raises. This makes it practicable to report the disease to the health authorities as soon as it reaches the stage dangerous to the public, and gives opportunity for the proper precautions to be taken.

"The reporting of other dangerous diseases has enabled the Michigan board to place pamphlets of instruction as to how to restrict each disease where they would do the most good and at a time when they would be read. The statistics gathered prove that this method has been the means of great reductions in the death rate, especially from scarlet fever, which has been reduced one-half. Consumption is to be reported in the same way and dealt with in a similar manner, and it is expected that the death-rate can be greatly reduced.

"The educational campaign will begin with the consumptive person, who will have instructions how to avoid communicating it to others, and those in contact how to prevent contracting it. The most important action will be the destruction or disinfection of all the sputa which contained the germs of the disease. The Michigan board is probably the first to take this action requiring notification of every case of consumption to local health officers, and by them to the State board, so that prompt action can be taken for its restriction."

In the absence of the Secretary, this letter was answered by the clerk in charge, and all printed matter of the Board, bearing on the subject, was sent to Doctor Corwin, which he acknowledged a short time after as follows:—

"Accept my warmest thanks for your kind letter of the 11th, and also for the diagram, etc. We in Colorado are greatly interested in this Michigan movement."

November 6, 1893, Chas. L. Wedding, Attorney at Law, of Evansville, Ind., wrote to the Secretary of this Board relative to consumption, as follows:—

"Kindly mail me tracts, about consumption, etc., mentioned in Herald of Health, November number, page 355.

"I regard your work as the noblest that men are now doing for the world."

The following answer was sent to Mr. Wedding, Nov. 8, by the Secretary of this Board:—

"In accordance with your request of Nov. 6, I have sent you under separate cover, some publications of this Office relative to the restriction and prevention of consumption.

"In exchange I shall be glad to have any publications which you may at any time have to spare bearing directly or indirectly upon any public-health subject."

November 20, 1893, Dr. John Winters Brannan of New York City, wrote to the Secretary of this Board, for information relative to the action taken by the Board, for the restriction of consumption in Michigan. The following is a copy of Dr. Brannan's letter:—

"At an approaching meeting of the Pediatric Section of the New York Academy of Medicine, I am to read a paper on Municipal regulation of contagious diseases, and I intend to urge that consumption should be officially declared a contagious disease by the local board of health. I learn that the Michigan State Board of Health has recently taken action in this direction. At the suggestion of my friend Dr. Prudden, I write to ask if you will not kindly send me copies of any official orders or circulars that you may have issued or are about to issue in accordance with your recent decision.

"Michigan has led the way in this important matter, and we would be glad to have the benefit of her experience."

The above-quoted letter from Dr. Brannan was answered by the Secretary of this Board, Nov. 22, 1893, as follows:—

"In response to your letter of Nov. 20, I take pleasure in sending you by this mail, copies of the resolution adopted by this Board at its meeting, Sept. 30, relative to consumption; also a copy of the proceedings of that meeting which refers to the success which has attended similar work relative to other diseases, notably that relative to scarlet fever.

"I send you a copy of the pamphlet, relative to the Michigan State Board of Health Exhibit at the Columbian Exposition, in which I have marked parts bearing on this subject, including the demonstration of the fact that the mortality from scarlet fever in Michigan has decreased more than one-half since notification of cases, and the distribution of pamphlets, telling how to restrict the disease, these having been distributed to the neighbors of the persons sick. Our statistics show that if isolation and disinfection were enforced in all instances the decrease would be very much more than one-half. One diagram in this pamphlet shows that at least four-fifths of the cases and deaths, after the first case occurred, are prevented by isolation and disinfection.

"Michigan has a system of sickness statistics, and the sickness statistics corroborate the mortality statistics relative to the decrease of scarlet fever. I have marked a diagram on this subject.

"I enclose a pamphlet containing the two paragraphs of law referred to in the resolution.

"I shall be glad to receive for the library of this Board, and for myself, anything which you can conveniently send at any time bearing directly or indirectly upon any public-health subject."

In response to the above letter from this Office, Dr. Brannan wrote to the Secretary of this Board, Nov. 28, acknowledging the receipt of letter and documents sent to him, and on Dec. 14, 1893, he wrote again, relative to consumption, as follows:—

"I am very much obliged to you for all these documents. I shall use them in my paper this evening.

"I shall argue in favor of the use of the word 'communicable' in place of 'contagious,' in describing tuberculosis. The New York Board of Health has just taken action similar to that of the Michigan Board, requiring notification by physicians of all cases of pulmonary tuberculosis."

Vincent Y. Bowditch, M. D., of Boston, Mass., wrote to the Secretary of this Board, Dec. 8, 1893, for information relative to the action taken by the Board, for the restriction of consumption in Michigan. Below is given a copy of his letter:—

"Will you kindly tell me exactly what course is to be taken by the Michigan Board of Health in reference to tuberculosis? I have been rather startled to read that it is to be classed on the same par as the acute infectious diseases, with you; and I am very desirous of knowing a few details. Would you send me word? and oblige."

December 11, 1893, the Secretary of this Board answered the above letter as follows:—

"In response to your letter of Dec. 8, I send you by this mail (1) a copy of the resolution adopted by this Board at its last regular meeting, (2) a copy of 'Abstract of Proceedings' which includes mention of some of the reasons for the resolution, (3) a copy of our pamphlet on the restriction of consumption, and (4) a copy of a pamphlet relative to our Exhibit at the World's Fair at Chicago, in which I have marked diagrams demonstrating results of work relative to scarlet fever, similar to that proposed relative to consumption.

"I shall appreciate it highly if you will kindly write me briefly your views, after you have examined the material which I send you."

December 16, 1893, the Secretary of this Board received a letter from R. H. Honner, M. D., inviting him to read a paper before the Wayne County Medical Society, on the subject of the prevention of consumption. A copy of the letter is given below:—

"At a recent meeting of the Wayne County Medical Society the subject of the prevention of pulmonary tuberculosis was discussed. The interest taken in the subject and the fact that the State Board of Health has taken action on the question suggested to some of the members the advisability of inviting you to read a paper on the subject before the society. We meet the first and third Thursdays of each month, but in case time and inclination permits you to accept I would be pleased to arrange for a special meeting to suit your convenience.

"Hoping to hear from you soon in the form of an acceptance, I am,

"Yours respectfully."

In answer to the above-quoted letter the Secretary of this Board wrote to Dr. Honner, Dec. 22, as follows:—

"Your letter of December 16, relative to the prevention of pulmonary tuberculosis, and proposing that I read a paper on that subject before the Wayne Co. Medical Society, is before me. I have delayed answering it a few days hoping that I might see my way clear to accepting the invitation. I cannot certainly promise now until after the next meeting of this Board, which is to occur here January 12. I do not think I can read such a paper during January, but I might perhaps by the third Thursday in February, if it should still be considered desirable then.

"If opportunity occurs, I will present your letter at the next meeting of this Board; perhaps the Board might be willing to pay my expenses to Detroit for that purpose."

In response to the invitation extended by Dr. Honner, Secretary Baker read a paper, entitled "Consumption as a Disease Dangerous to the Public Health," before the Wayne County Medical Society. After the reading of the paper, it was discussed by Drs. E. L. Shurley, Samuel Bell, E. B. Smith and others. The paper was published in the Medical Age, Detroit, March 10, 1894, and at the expense of Parke, Davis & Co., publishers of the Medical Age, reprints of the paper were made; these have been distributed about the State.

November 27, 1893, J. R. Williams, health officer of White Pigeon village, wrote to the Secretary of this Board, relative to the restriction of consumption, as follows:—

"I am glad to know that our Michigan Board has placed consumption in the list of communicable diseases. I have been satisfied for years that such a stand would be taken by *all* State Boards.

"About one year ago, Mrs. R —— residing in this place was taken sick and died of consumption. Her next door neighbor Mrs. E. B ——, a woman with good family history, healthy except for some uterine trouble, was frequently in attendance before Mrs. R —— died. Mrs. B —— showed symptoms of consumption and in less than a year after the death of Mrs. R ——, Mrs. B —— died of consumption. There was no consumption in the family. The father and mother of Mrs. B —— are living and in good health, and so far as I can trace, the family are free from consumption. Here is a clear case."

John D. Greenamyer, M. D., health officer of the city of Niles, wrote to the Secretary of this Board, for information relative to the correct way of reporting cases of consumption to this Office. Below is given a copy of Dr. Greenamyer's communication:—

"In making up my report on consumption, should it be based only on the new cases since the report immediately preceding, or should it include the new cases as well as those already reported and not recovered. On account of the recovery being the exception, and the lingering nature of the disease it will make some difference which view of the case you take. Please advise me."

In reply to the questions of Dr. Greenamyer, the Secretary answered Nov. 29, as follows:—

"In response to your card of Nov. 28, relative to consumption.

"You say:—'In making up my report on consumption, should it be based only on the new cases since the report immediately preceding, or should it include the new cases as well as those already reported, and not recovered?'

"In your weekly postal-card reports, you should report *all* cases under your observation.

"In the weekly report on blank 'M,' the cases sick previous to the week for which the report is made, should be reported in the first column—'How many sick at close of last week?' The *new* cases are noted in the proper column, which is headed:—'How many taken sick?'"

The Secretary of the State Board of Health received a letter from the Secretary of the Jackson Board of Health saying "Will you please inform the Board of Health of Jackson regarding 'Consumption as a contagious disease?'" The following is the reply:—

"*Dr. Charles A. Littler, Secretary Board of Health, Jackson, Michigan:*

"DEAR DOCTOR:—Your letter of Nov. 9, asking questions relative to the restriction of consumption, is before me. I have not of course had opportunity to place your questions before this Board; but, in the interval of a meeting of the State Board of Health, my views on the questions, are as follows:—

"1. Shall physicians be required to report their cases to the Board of Health the same as other contagious diseases? *Ans.* Yes, physicians and householders.

"2. Shall known or supposed cases of consumption be allowed to attend the public schools? *Ans.* That is for the health officer, and local board of health to decide; but the law, Act 137 Laws of 1883, requires the health officer to 'order the prompt and thorough isolation of those sick or infected with such disease, *so long as there is danger of their communicating the disease to other persons.*' I think there is usually danger in a school from a consumptive pupil or teacher, in the dangerous stage of consumption when it will be 'known' that the patient has consumption.

"3. Shall undertakers be required to exercise the same precautions in burial and in transportation by R. R. of bodies in cases of consumption as in other contagious diseases? *Ans.* It is probable that the danger from spreading this disease by a dead body is not so great as in the case of diphtheria*. Yet the uncovered face should not be exposed except through glass.

"4. Shall the board of health placard the abode of persons sick with consumption? *Ans.* 1673 Howell's Statutes leaves this to the judgment of the local board of health. Act 137, Laws of 1883, requires the health officer to 'give public notice of *infected places.*' If a place is *infected* public notice must be given. If proper precautions are constantly observed the premises of a consumptive need not be infected.

"5. Shall the board of health keep a record of all cases of consumption reported, etc? *Ans.* Yes, by all means.

"If this office can be of further service to you, it will give me pleasure. By this mail I send you a copy of the Proceedings of this Board, in which this subject was dealt with.

"Very respectfully,
"HENRY B. BAKER,
"*Secretary.*"

## *Dangerous Location of Consumptives.*

The following is a sample of some of the notices which were received by the Secretary of the State Board of Health, following the action taken by the State Board, classing consumption with "diseases dangerous to the public health":—

"*M——, December 12, 1893.*

"This is to inform the Hon. State Board of Health that there is at this time pulmonary consumption in the house of Mrs. ——, postmistress of this place. The office is kept in the dwelling or rather a small room attached thereto. The husband died of same about 8 years since. Oldest son died about first of June of the present year, at Denver, Colorado, about 26 years of age, remains brought home for interment. A daughter died of same some 10 days since; was a married lady about 23 years of age. Another son, about 19 or 20, is in the last stage, cannot survive many days. The danger to public health here, in my opinon, arises from its being a public place much frequented of necessity by the public for mail delivery.

"Yours with respect,
"*Health Officer of —— Tp., —— Co., Mich.*"

The Secretary of this Board wrote, Dec. 14, 1893, in answer to the above-quoted letter, as follows:—

"Accept thanks for your letter of Dec. 12, relative to consumption.

"By this mail I have sent to Mrs. ——, the postmistress at ——, two copies of our four-page leaflet on the restriction and prevention of consumption, and I have marked those parts which relate to disinfection.

"I realize the fact, that in this instance the disease is located in a particularly dangerous place. It would seem to be important to disinfect the whole premises as soon as the death occurs which you think probable, and *that* disinfection should include all the contents of the premises. I do not understand from your letter that Mrs. R—— herself has consumption. I infer that as soon as the son has passed away the last consumptive in the family will have gone. If that is so and the premises are properly disinfected the public-health interests will no longer be endangered.

"I shall be glad to hear from you again on the subject.

"By this mail I send you a few of our leaflets on the subject of consumption, and can send you more if you think you can distribute them where they will be useful."

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*[This view then expressed may not be correct; because, after reflection, it is apparent that in diphtheria the germs of the disease are in the throat and as a rule nowhere else, that is to say, only the sputa would be likely to spread the disease; and in consumption the germs are also confined to the sputa. It may be found that one disease is as liable as the other to be spread from the body, and that the reason why this has not been learned before is because the period of incubation is so much longer in consumption than in diphtheria. H. B. B., Sec. S. B. of H.]

## TYPHUS FEVER THREATENED IN 1893.

During the year ending December 31, 1893, there was no typhus fever in Michigan, but reports and information relative to cases of this disease were received at this Office, as follows:—

An interstate communication gave notice of three cases of this disease in Philadelphia, Penn. The Secretary of the Board of Health of the Province of Quebec reported a case of typhus in an emigrant, who reached Montreal after landing at Halifax.

The following postal was received at this Office April 6, 1893, from Dr. Elzear Pelletier, Secretary of the Board of Health of the Province of Quebec:—

"It becomes my duty to inform you that an immigrant suffering from typhus has reached Montreal after landing at Halifax on the 29th March. The patient is presently isolated in the Montreal Civic Hospital."

Upon receipt of the above notice, the Secretary of this Board wrote to Dr. Pelletier, April 6, 1893, asking for the name of the ship on which the above-mentioned immigrant came to Halifax and from what port the immigrant embarked.

The information asked for was received; and the following circulars were issued from this Office for the information of health officers and for publication in newspapers throughout the State:—

"LOOK OUT FOR TYPHUS.

"*Recent Immigrants may bring Typhus, even from a Port Reported Uninfected.*

"*To Health Officers in Michigan:*

"I am informed by the Inspector of Health for the Province of Quebec, that W. J. Cook, an English immigrant, from Worthing, Sussex, England, now lying sick with typhus in Montreal civic hospital, embarked at Liverpool, March 16, last, on the Allan steamship 'Buenos-Ayrean,' and landed at Halifax March 29. On reaching Montreal, March 30, this immigrant was brought sick out of the Halifax train, and carried to the Montreal general hospital, where he remained under observation until Saturday, April 1, when his disease was recognized as typhus, and he was removed to the civic hospital.

"The U. S. Consul General at Halifax, in a letter of April 4, informs me that at Halifax the baggage of immigrants from 'Norway, Sweden, Denmark and Great Britain' is not so rigidly disinfected as the baggage of immigrants from other European countries, and we know that at most of the Atlantic ports such baggage does not undergo any disinfection whatever; and, even if we were to admit that typhus is spread only directly from the infected person, the inspection of immigrants from Great Britain may not be so rigid as from Germany or Russia.

"As immigrants coming into this country may have been exposed to the disease at the same time this man was, or to this case of typhus, either on the 'Buenos-Ayrean' or at Halifax en route by rail to Montreal, this notice is sent to you that you may keep recent immigrants to your locality under surveillance, in order to detect the first symptoms of typhus, should they develop, and, isolate the patient before others are exposed to this very dangerous contagious disease.

"Very respectfully,
"HENRY B. BAKER,
"*Secretary.*"

"*Office of the Secretary of the State Board of Health,*
*Lansing, Mich., April 11, 1893.*"

### "*The Prospective Danger from Tphus Fever.*

"At the meeting of the Michigan State Board of Health, Lansing, April 14, 1893, Secretary Baker presented the following:—

"Typhus fever is a dangerous contagious disease which we do not have in Michigan except it be brought into the State. It broke out in New York city last fall, and the Board of Health has not yet succeeded in stamping it out. It has been quite prevalent in many places in Mexico during last fall and winter, and although there have been U. S. Inspectors of travelers along our Mexican border, one case of typhus occurred at Laredo, Texas, and March 23 one case was reported at New Laredo, Mexico. March 27 one case of typhus fever was reported in the hospital at Cincinnati, Ohio. March 30 one case of typhus fever was removed, from an immigrant train from Halifax, to a hospital in Montreal. He was an English immigrant who embarked at Liverpool March 16.

"There is nothing alarming in this summary statement relative to typhus fever, and it is fortunate that it is now the spring of the year, and typhus spreads most in cold weather; yet it must be acknowledged that the actual presence of typhus in several places on this continent; and that a case has just occurred in a man who was one of a ship-load of immigrants from Liverpool, and who had just come through the quarantine at Halifax, adds to the anxiety of officers charged with guarding life and health in this country during the coming World's-Fair year, with cholera threatening and likely to be imported."

# CHOLERA—ALLEGED SPORADIC CASES OF WHICH WERE REPORTED IN MICHIGAN DURING THE YEAR 1893; AND INFORMATION RELATIVE TO ITS PRESENCE AT THE PORT OF NEW YORK.

Cholera was wide-spread in Asiatic and European countries during the year 1893. The number of immigrants and travelers from these infected districts into the United States was probably increased by those who came to America for the purpose of visiting the Exposition at Chicago.

Cholera occurred among immigrants who arrived at the Port of New York; there were also cases and deaths from cholera in New York City, but by the work of competent health officials in these places its spread to other localities was prevented. A large amount of work was done by this Board, and by other State Boards of Health, to guard against the entrance of cholera. On account of the exposed position of Michigan and the liability of infected immigrants passing into the State from Canada, an inspection was made at the Michigan-Canadian border of all immigrants and travelers who passed into Michigan. In the spring of 1893, at the request and at the expense of the Grand Trunk Railroad, an agent of this Board was stationed at the Port of Quebec, whose duty it was to oversee the fumigation of immigrants' baggage, and issue certificates for such as had been disinfected in accordance with rules adopted by the Michigan State Board of Health. Immigrants who arrived at the Michigan border in apparent good health, and whose baggage was stamped by the agent of the Board, at Quebec, were allowed to pass on without further detention.

Numerous documents were published and sent out from this Office, setting forth the best methods to be employed in preventing the entrance of cholera into a locality, and in the event of an outbreak of the disease, the most effective means to be used by the local health officials in the isolation of patients, and disinfection of articles likely to carry the infection. Copies of these documents are printed in the proceedings of the meetings of the Board, with discussions relative to the same, revisions as they were made, and a report of the work done by inspectors at the border, made by the Secretary of the Board; also court decisions relative to the authority which the State Board of Health has in the enforcement of inspection and quarantine at the border. These articles will be found in the "First Part" of this Report, and are a continuation of the work done by this Board in the previous year, which will be found printed in the proceedings of meetings, and the article on cholera, in the Report of this Board for 1893.

## ALLEGED SPORADIC CASES OF CHOLERA IN MICHIGAN IN 1893.

Alleged sporadic cases of cholera were reported during the year 1893, from two localities in Michigan, as follows: Calvin township, Cass county, and the city of Grand Rapids.

### *Alleged Case of Cholera in the City of Grand Rapids.*

An article in the "Evening Press," published in Grand Rapids, Sept. 25, 1893, stated that a resident of that city was suffering from Asiatic cholera. This article coming to the notice of the Secretary of this Board, he wrote to Dr. T. D. Bradfield, health officer of Grand Rapids, Sept. 27, as follows:—

"It is alleged that 'Mrs. William Fuller, of 291 Dean street,' in your city, was taken ill Sept. 25, 'with violent pains and all symptoms' of cholera. Dr. R. A. Fuller, is said to have been the attending physician.

"I would be pleased to learn whether she had recently come into contact with any immigrant or other person who, or thing which, was liable to have been infected with cholera; and whether there was any examination made of the excreta bacteriologically with a view of ascertaining the true nature of the disease. Also what precautions were and are being taken to prevent the spread of the disease."

Sept. 30, W. A. Wilson, M. D., secretary of the city board of health, answered the above-quoted letter as follows:—

"In reply to yours of the 27th inst. I have to report, so far as we are able to ascertain, the cholera case—Mrs. Wm. Fuller, of 291 Dean street, an American woman—has not been away from home, and has not been in contact with immigrants or with people or property that could in any way communicate the disease.

"I enclose you clippings from the 'Evening Press'—a paper published in this city—that will give all that we know of the case. The case was not reported to this department."

Below are given the newspaper clippings which were inclosed in the above-quoted letter from Dr. Wilson:—

"*A Genuine Case of Cholera Occurs in Grand Rapids.*

"There is a case of genuine Asiatic cholera in town. The patient is Mrs. Wm. Fuller of 291 Dean street. This morning about 8 o'clock Mrs. Fuller was seized with violent pains and all the symptoms of the disease. Dr. R. A. Fuller was sent for and when he arrived he found the patient on the verge of collapse. He remained by her side all day, and at 3 o'clock a reaction had set in. She is still in a very dangerous condition. Mrs. Fuller has not been out of the city, and it cannot be surmised how the disease was contracted. The doctor thinks it is sporadic. Mrs. Fuller is 38 years old and the mother of three children."

"It was Grapes, *and not Cholera, that Prostrated Mrs. Fuller.*

"Dr. R. A. Fuller, who is attending Mrs. Wm. Fuller, the lady whom he diagnosed as suffering from Asiatic cholera yesterday, admits that he was mistaken as to the nature of the disease. He called Dr. Luton in consultation and it was decided that the malady was what is known as an impaction of the bowels, an extremely rare ailment, similar in all its manifestations to cholera.

"'Her illness was undoubtedly caused by eating a large quantity of grapes, seeds and all, the day before,' said the doctor this morning. 'The hard seeds collected and lodged in the ilio cæcal valve closing the intestine completely. When I reached her yesterday she manifested every symptom of cholera. Her lips were blue, the features were pinched and she was in a collapse. Any physician in the world would have diagnosed the disease as cholera. In fact it is more dangerous than that disease and recoveries are far less. She is still in a very dangerous condition and it is impossible to predict the outcome.'"

### *A Suspected Case of Cholera in Calvin Township, Cass County.*

Abner R. Byrd, clerk of Calvin township, Cass county, sent an outbreak report to this Office Aug. 1, 1893, in which he stated that James F. White, a man 35 years old, residing in his jurisdiction, was supposed to have cholera. The source of the disease was unknown; he was taken sick the day previous (July 31), and that the premises and all persons exposed had been quarantined.

On receipt of the above report the Secretary of this Board wrote the following letter to J. L. Robinson, health officer of Calvin township, and a similar letter was sent, the same day, to Mr. Byrd:—

"I am in receipt of an outbreak report of Aug. 1, from the clerk of Calvin township, Abner R. Byrd, relative to a supposed case of cholera. Patient's name is James F. White, aged about 35 years, who was taken ill July 31. By this mail I send you pamphlets on the prevention and restriction of that disease, and blanks for reports to this Office.

"Did the patient live or die? I would be pleased to learn whether the patient is an immigrant, and if so, when he arrived at the port of landing in this country, and in what ship, and when he landed. At what port did he go aboard the ship, and of what nationality is he? When did he arrive in Calvin township?

"Will you have the kindness to give me the name and address of his attending physician? Also ask the physician to inform this Office relative to the symptoms of the disease, and of any particulars relative to the case that are of interest? If it is really Asiatic cholera, telegraph the facts."

In reply to the above-quoted letter from this Office, J. L. Robinson wrote, Aug. 8, as follows:—

"The case reported to you as cholera, was pronounced cholera by the attending physician. The patient died within 24 hours from the time he was taken sick. His name was Jas. F. White; claimed to come here from South Bend, Ind. We at once instituted strict quarantine regulations, and there have been no new cases. I at once notified the health officer at South Bend."

The Secretary of this Board wrote, Aug. 14, in answer to the above letter, as follows:—

"Accept thanks for your weekly report for the week ending Aug. 3, relative to the supposed case of cholera, also for your letter of Aug. 5, relative to the same subject. I asked you in my letter of Aug. 3, to give me the name and address of the physician who attended the case, also whether the patient was an immigrant or not. You have failed to do so in your letter. Will you have the kindness to telegraph this Office, immediately upon the receipt of this letter, and inform us whether the patient was an immigrant, and give the name and address of the attending physician? Please attend to this promptly this time."

Mr. Robinson answered the above letter Aug. 16, as follows:—

"Yours of the 14th at hand. In reply will say, the supposed case of cholera was not an immigrant, he was not a permanent resident anywhere; he came from South Bend here. The attending physician's name is John A. Harris, of Day, Cass county, Mich."

Aug. 18, 1893, J. L. Robinson sent a final report, of the supposed case of cholera, to this Office, which stated substantially as follows:—

"The party died of supposed cholera, two days after his arrival here from South Bend, Ind. The patient was kept isolated from all persons except the nurse and physician; the house and all articles likely to carry the contagium were disinfected. No other cases occurred.

### *Cholera at the Port of New York.*

The following newspaper articles give a general idea of the presence of cholera at the Port of New York. The first article appeared in the Detroit Evening News of Aug. 10, 1893:—

"LANSING, Mich., Aug. 10.—The Secretary of the State Board of Health received a telegram last night from Surgeon-General Wyman, of the United States Marine hospital service, to the effect that a patient suffering from genuine Asiatic cholera had been removed from the steamship Karamania. The patient was taken to Swinburne Island. Another prospective case was found, and the patient was taken to Hoffman's Island. The Karamania arrived at New York from Naples Aug. 3 and has since been under surveillance. Three deaths occurred during the trip from Naples. The boat was immediately detained by the quarantine officers."

The same issue of the Evening News contained the following communication from New York:—

"NEW YORK, Aug. 10.—Vincenzo Cagliostro, aged 23 years, died in Swinburne Island hospital last night of Asiatic cholera. He was one of the passengers that arrived on the Karamania from Naples last week. He was the only one who was ill, all the other passengers being removed to Hoffman Island, where they still remain."

The following article appeared in the Detroit Tribune of August 12, 1893:—

"QUARANTINE, SWINBURNE ISLAND, Aug. 11.—Health Officer Jenkins issued the following bulletin at 12:45 o'clock this afternoon:

"The bacteriological examination of cultures made from the two cases removed yesterday, Francisco Mola and Mariano Riberaco, resulted in finding the spirilla of Asiatic cholera in each case. Both patients are in the same condition as when removed—no better, no worse. Two cases were removed from Hoffman Island at noon today to the hospital at Swinburne Island, both showing choleraic symptoms. The bulletin has been held back so that the names could be included. They are: Antonio Lauriti, aged fifteen years; Antonio Carlon, aged fifty years.

"At 9 p. m. Health Officer Jenkins issued this bulletin: 'At 4 p. m. three cases were transferred to Swinburne Island from Hoffman and at 7:30 p. m. two more were taken to the same place. The first three are Giovanni Lauria, aged thirty-three years, an Italian; Fernandi Troisi, aged thirty-five years, also a native of Italy, and Georgis Crears, aged thirty-five years, a Greek. The others are Domenico El Cioppo, aged seventen years, and Antonio Pierimi, aged twenty-one years, both Italians. All showed characteristic symptoms of cholera. The bacteriological examinations of the cases removed today have not been completed as yet. The census of the hospital shows ten patients, one of whom is convalescing. In three of the ten the diagnosis of cholera has been confirmed. All are well on the Karamania. Thus far all the cases have developed within the period of incubation after the removal of the passengers from the steamer. The Massilia was discharged from quarantine today, her passengers having been nineteen days out from Naples without the slightest evidence of cholera appearing. Her bills of health were dated at Marseilles, July 15, and Naples, 22d.'"

## CHOLERA INFANTUM IN MICHIGAN IN 1893.

During the year 1893 the number of weekly card-reports of sickness received at this office which stated the presence of cholera infantum was one per cent less than in 1892, and three per cent less than the average for the years 1877–92.

Only two health officers made special reports of the presence of this disease in their jurisdiction,—N. S. Taylor, Geneva township, Van Buren county, reported four cases; W. C. Nowlen, Hatton township, Clare county, reported one case which proved fatal.

## CHOLERA MORBUS IN MICHIGAN IN 1893.

The number of weekly reports of sickness which stated the presence of cholera morbus was slightly less in 1893 than in 1892; and was also less than the average for the years 1877–92.

Relative to this disease, the Detroit Evening News of June 21, 1893, contained the following paragraph:—

> "JACKSON, MICH., June 21.—Physicians report a great many cases of severe cholera morbus, with extreme symptoms resembling cholera. One doctor said: 'I have had a large number of such cases. They are hard to control, and many of the attacks are extremely severe.' The News inquired of other physicians and found the complaint quite general, especially in the northeast part of the city."

June 22, 1893, the Secretary of this Board wrote as follows to Dr. Z.W. Waldron, health officer of the city of Jackson:—

> "An item in the Detroit 'Evening News' of June 21, states that in Jackson Physicians report a great many cases of severe cholera morbus, with extreme symptoms resembling cholera. One doctor said: 'I have had a large number of such cases. They are hard to control, and many of the attacks are extremely severe.' The News inquired of the other physicians and found the complaint quite general, especially in the northeast part of the city.'
>
> "I would be pleased to hear from you relative to the subject.
>
> "Outbreaks of Asiatic cholera quite often begin in the manner described in that item. A prompt investigation and report by you will be appreciated."

June 27, 1893, Dr. Waldron replied to the Secretary's letter as follows:—

> "In answer to yours of the 23d inst. I would say that the item you refer to from the Detroit Evening News of June 21st probably took its origin from a remark I made to one of its reporters when he asked me the prevailing sickness a few days ago. I told him bowel and stomach troubles. Also that I had had severe cases of cholera morbus, some with extreme symptoms difficult to control. I have made inquiries among several physicians and while they have had cases, none were of such severe type as the article referred to would lead one to infer. A week ago last Saturday a man by the name of Wm. Glass, a box manufacturer, was taken sick while alone in his factory and lay so perfectly prostrated that he was unable to call for assistance. Three hours after a man seeing his horse wandering about looked inside and found him lying on the floor unable to move and with barely strength enough to whisper. I was sent for and found him in the condition just stated, and with a feeble pulse and cold extremities. He soon rallied however from the effects of hypodermic injection of atropin and morphine, and in three hours was in a condition to be carried to the residence of his partner, and recovered in a few days. He states that the attack came on suddenly with vomiting and purging, he soon lost all control of his bowels which 'ran off' as he claims 'like water.' His greatest suffering was from cramping in the legs. This is the worst case I have had this year. Last fall I was called by Dr. W. H. Palmer to see one of his patients who was taken in much the same way. He had been taken about four P. M. Dr. P. was called about 5 P. M., and states that he administered a hypodermic injection of morphine, also gave him a large quantity of brandy, his bowels in the meantime were running off without control, in the bed, and he was in terrible distress from cramping of the legs. All remedies seemed to be without effect and at 11 P. M. he sent for me. I found him in a state of collapse, with absolutely no pulse at the wrist. The heart's action could barely be detected. The entire surface of the body was cold. Although he had taken nearly a pint of brandy there was not the faintest trace of it in his breath. He could occasionally be induced to talk a little in whispers. He had already had all the morphine I thought it was safe to give, and hypodermic injections of atropin failed to help him. Nothing we were able to do with heat or medication seemed to have the slightest effect on him, and he died about 1 o'clock A. M., a little over 9 hours after the commencement of the attack. There have been quite a number of cases of diarrhea of late here which I attribute to the wet weather and immense amount of surface water which we have been having. In the treatment of my cases I have found nothing so efficient and satisfactory as sulpho carbolate of zinc. The usual astringents, cathartics, pepsin, etc., have totally failed in most cases."

## RÖTHELN (GERMAN MEASLES) IN MICHIGAN IN 1893.

During the year 1893, the occurrence of three outbreaks of rötheln was reported to this Office, from the following-named localities:—Butler township, Branch county; Hatton township, Clare county; and Tekonsha village, Calhoun county.

Relative to the first-mentioned outbreak Samuel A. Smith, health officer of the locality, wrote to this Office, Jan. 20, 1893, substantially as follows:—

"Dr. J. J. Heater informed me night before last there was a case of Rötheln, at the house of Mr. J. L. Green. I went there yesterday. Found the patient up and feeling better. I went to the schoolhouse. The teacher said that a rash had been prevalent among the pupils. The children having the rash would feel sick for a day or two, but continued to attend school. The disease was very general throughout the township, little notice being taken of it. Mr. Green was displeased because I insisted in placarding his premises."

Jan. 28, 1893, the Secretary wrote in reply to Mr. Smith's letter, as follows:—

"Accept thanks for your letter of Jan. 20, relative to Rötheln. This Board has voted that Rötheln is a 'disease dangerous to the public health' and as such should be restricted the same as measles, scarlet fever, diphtheria, etc. It is at times very difficult to distinguish between Rötheln and measles or scarlet fever, and the general public should be given the benefit of the doubt."

Relative to the outbreak of rötheln in Hatton township, the health officer reported that precautionary measures were taken to restrict the spread of the disease.

Relative to the outbreak of rötheln in the village of Tekonsha, the health officer, Jno. L. Ramsdell, M. D., reported "We have been having an epidemic here; no attention has been paid to it."

## MUMPS (PAROTITIS) IN MICHIGAN IN 1893.

During the year 1893, there was one outbreak of mumps reported to this Office, from Mattison township, Branch county. In this outbreak four cases of the disease were reported to have occurred. Two of the patients were males and the other two females. The males were aged 40 and 18 years, and the females 41 and 43 years. The clerk of the township, A. C. Judd, who reported the outbreak, gave no further details relative thereto.

## PUERPERAL FEVER IN MICHIGAN IN 1893.

Two cases of puerperal fever were reported to this Office as having occurred in this State during the year 1893. One case was in the village of Crystal Falls, Iron county; and the other in the city of Escanaba. In reporting the former case the health officer stated that the precaution of prohibiting the entrance of other women into the presence of the patient had been taken. In writing to the Secretary of this Board relative to the case in Escanaba, the health officer said:—

"You will notice from my weekly report ending Feb. 4th we had one case of Puerperal Fever. We have two or three midwives in our city who confine numbers of the ignorant class of females and I regret to say a goodly number of the so called better class. The result is we have a great many deaths during the year, of lying in women; and from my experience, due to causes easily removed if properly managed.

"These midwives have no certificates. Have not registered. Under the circumstances can we prevent them from practicing or prevent the ignorant from employing them?"

In reply to the above-quoted letter from Dr. C. H. Long, the Secretary wrote, Feb. 17, 1893:—

"Please accept thanks for your letter of Feb. 14, relative to puerperal fever and midwives.

"By this mail I send you a copy of the Public Health Laws in force in 1892, in which I have marked the law on the practice of medicine or any of its branches.

"It is unlawful for any person to practice medicine or surgery, or any branch thereof (except dentistry) in the State of Michigan unless such person has filed with the county clerk a sworn statement of the length of time he has been engaged in the practice of medicine, and if a graduate of any medical college, the name of the same and where located, when he graduated and the length of time he attended the same, and the school of medicine to which he belongs.

"No person who practices medicine, surgery, midwifery, in any of their branches, shall be able to collect pay for their practice unless such person is duly qualified and registered as a medical practitioner in accordance with the law.

"It is the duty of the supervisor and the *health officer* of the local board of health in each township, village, ward or city to enforce the law.

"I think it is your duty to place the complaint before the prosecuting attorney of your county."

Although there were 42 deaths from puerperal fever reported in this year (1893) to the Secretary of State, only the above-mentioned two cases were reported to this Office.

It would seem that due importance is not given to this malady as a contagious and fatal disease.

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## ERYSIPELAS IN MICHIGAN IN 1893.

During the year ending December 31, 1893, there were reported to this Office three instances of erysipelas in the following-named localities of Michigan: Saginaw, W. S., Saginaw county, 1 case; South Haven village, Van Buren county, 1 case; and at the Asylum for the Insane, located at Kalamazoo, 7 cases.

## CORRESPONDENCE RELATIVE TO THE DISINTERMENT AND REMOVAL OF DEAD BODIES.

During the year ending December 31, 1893, the Secretary of the State Board of Health received a number of letters of inquiry relative to the opening of coffins containing the bodies of persons dead of probably communicable diseases, and others asking for information as to exhuming dead bodies and removing them from one locality to another. The correspondence on this subject is given below.

Edwin Stewart, M. D., health officer of Mendon village, St. Joseph county, wrote to the Secretary of this Board, March 8, 1893, relative to the opening of a casket containing the body of a person dead of typhoid fever. The letter is as follows:—

> "Accept thanks for rules to be observed in the shipment of persons dead of contagious diseases. I fear my letter was not clear enough to be understood. What I desire to know, and what should be known by the public, is what law or what rule is to prevent the opening of the casket when it is received? I understand the difference (or think I do) between typhoid and other contagious diseases, but perhaps the public do not.
>
> "In this particular case that I wrote about, I expect the undertaker was mistaken when he told me the box was marked Typhus, but it seems to me that was no greater mistake than opening the coffin at the parents' home and allowing it to be viewed by the neighbors. That was done three miles from the church where the funeral was held.
>
> "Now the father of the young man deceased feels like punishing the undertaker if he finds that he did make a mistake.
>
> "The undertaker called on me when going with the hearse for the body, to inquire for directions. I told him he might take it into the church but not to open it. The last word he said when he went out was that the box was marked *Typhus*.* But he was gone, so I was at the church when the procession arrived, and told him not to take it from the hearse. The friends were annoyed and delayed until a gentleman presented me with the official statement of "typhoid," then it was carried into the vestibule.
>
> "There have been two cases of typhoid-deceased subjects brought here during the year; one from Grand Rapids and this last from Traverse. The consignee of the first consulted me about opening the coffin, and we agreed that it should not be opened. I found after that they had attempted to open it, but found it so thoroughly sealed and soldered that they desisted."

March 10, 1893, the following letter was sent from this Office to Doctor Stewart:—

> "Please accept thanks for your letter of March 8, relative to the opening of coffins, caskets, etc., shipped to a locality.
>
> "At present I know of no way of remedying the difficulty which you state, except a general education of the people, as to how diseases are spread."

The purpose of this publication is that "general education" just mentioned.

### PROPOSED DISINTERMENT OF A BODY, AND ITS REMOVAL FROM THE VILLAGE OF GAGETOWN, TUSCOLA COUNTY, TO IMLAY CITY VILLAGE, LAPEER COUNTY.

M. R. Lyman, M. D., health officer of the village of Gagetown, Tuscola county, wrote to the Secretary of this Board, March 24, 1893, relative to the disinterment and removal of a body, probably dead from typhoid fever. A copy of Dr. Lyman's letter is given below:—

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*[Typhus fever is a disease very readily spread from person to person.—H. B. B., Sec. S. B. of H.]

"A man by the name of M. J. Rourk died here last October. Cause of death, malarial fever complicated the last week (lived two weeks) of his illness with a typhoid condition.

"He was buried in a common coffin, and last week his friends from Almont came to remove the body but I objected to their doing so until I heard from you.

"Please let me hear from you as soon as convenient and give me your opinion of the case."

March 29, 1893, the following letter was sent from this office to Dr. Lyman, with some copies of law, bearing on the subject, enclosed:—

"Replying to your letter of March 24, relative to the disinterment of a body dead from 'Malarial fever complicated the last week with a typhoid condition.'

"Before I can issue a statement which will answer the purpose of a permit for the transportation of a dead body, it is necessary for me to have the following:—

"1. A certificate of the cause of death, by the attending physician, including not only the immediate cause of death, but also the sickness which led up to it.

"2. The permit of the health officer of the place *from* which the body is to be removed.

"3. The permit of the health officer of the place *to* which the body is to be removed.

"4. The assurance of the health officer of the place from which the body is to be removed, that the body shall be carefully prepared for transportation, strictly in accordance with Section 6 of Rule 52, of the General Baggage Agents' 'Rules'* which have been approved by this Board, and which may be seen at each railroad station, and on the back of this sheet."

March 30, 1893, Mrs. M. J. Rourk of Almont village, Lapeer county, wrote to this Office relative to the same case referred to above. The letter was as follows:—

"My husband M. J. Rourk died at Gagetown, Nov. 1, and the attending physician made out a certificate to the Order of Foresters, pronouncing his disease malarial fever complicated with la grippe. People came in and out of my house at will, and a public funeral was allowed, and now when we wish to move his body to Imlay City the doctor, also the undertaker, utterly refuse to let us take the body up or even open the grave to see that the body is all right as we have a suspicion in our minds that there has been foul play and the body has been foully dealt with. We petition you to send Mrs. Rourk of Almont, a permit to move this body to Imlay City, or if that is out of the question, to open the grave that we may know that it is all right.

"Very respectfully,

(Signed) "MRS. M. J. ROURK, AND FRIENDS OF THE DECEASED."

In answer to the above-quoted letter from Mrs. Rourk and others, the Secretary of this Board wrote, April 1, as follows:—

"Your letter of March 30, relative to the disinterment and removal of the dead body of Mr. Mathew J. Rourk of Imlay City, is before me.

"Before I can issue a statement which will answer the purpose of a permit for the transportation of a dead body, it is necessary for me to have the following:—

"1. A certificate of the cause of death, by the attending physician, including not only the immediate cause of death, but also the sickness which led up to it.

"2. The permit of the health officer of the place *from* which the body is to be removed.

"3. The permit of the health officer of the place *to* which the body is to be removed.

"4. The assurance of the health officer of the place from which the body is to be removed, that the body shall be carefully prepared for transportation, strictly in accordance with Section 6 of Rule 52, of the General Baggage Agents' 'Rules' which have been approved by this Board, and which may be seen at each railroad station, and on the back of this sheet; also a copy of Rule 8, of the National Association of General Baggage Agents."

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* These rules are printed on pages lxxxvi-lxxxvii of the Annual Report for 1893.

### PROPOSED REMOVAL OF A DEAD BODY FROM OSHTEMO TOWNSHIP, KALAMAZOO COUNTY, TO ANOTHER LOCALITY.

Dr. T. C. Buskirk, health officer of Oshtemo township, wrote to this Office, March 29, 1893, relative to the disinterment of a dead body, from a cemetery in his jurisdiction, and its removal to a place some thirty miles distant. The letter was as follows:—

"In our cemetery there is a child which has been buried 26 or 28 years. Circumstances of death were these: He had scarlet fever, and two weeks after recovery died from a cold contracted during exposure to bad weather. Death was sudden, only a few days.

"The parents now wish to remove what is left of the remains, about 30 miles by railroad.

"I think there would be no danger after so long a time. What is your opinion?

"There would be no changes to make in transit, and the trip would not consume over an hour."

In answer to the above letter from Dr. Buskirk, the Secretary wrote April 4, 1893, stating substantially the same as is given in the letter from this Office to Dr. Lyman, printed above.

### PROPOSED DISINTERMENT AND REMOVAL OF DEAD BODIES FROM COMSTOCK TOWNSHIP, KALAMAZOO COUNTY, TO THE CITY OF KALAMAZOO.

March 30, 1893, Rush McNair, M. D., health officer of Kalamazoo township, wrote to the Secretary of this Board, relative to the disinterment of bodies, dead from diphtheria, and their removal to another part of the county. The following is a copy of Dr. McNair's letter:—

"During Jan., Feb., and Mar., of 1891, Lowel M. Drury, of the township of Comstock, this county, buried four children, dead from diphtheria, in his yard. He has since sold out and moved to Hartford, Van Buren county. He desires to exhume the bodies and rebury them in a Kalamazoo city cemetery.

"Provided the exhumed coffins are encased in new boxes and other precautions taken, can he be permitted to do so?

"The land was sold under agreement that the bodies should be transferred. And Mr. Drury has a very earnest desire to have his children finally repose in a cemetery.

"If this can be allowed please indicate also the manner in which it shall be done."

The following reply to Dr. McNair's letter was sent from this Office April 4, 1893:—

"In reply to your letter of March 30, relative to disinterring and removing the bodies of four children dead from diphtheria from Comstock Tp., Kalamazoo Co., to be interred in the Kalamazoo city cemetery.

"Before I can issue a statement which will answer the purpose of a permit for the transportation of a dead body, it is necessary for me to have the following:—

"1. A certificate of the cause of death, by the attending physician, including not only the immediate cause of death, but also the sickness which led up to it.

"2. The permit of the health officer of the place *from* which the body is to be removed.

"3. The permit of the health officer of the place *to* which the body is to be removed.

"4. The assurance of the health officer of the place from which the body is to be removed, that the body shall be carefully prepared for transportation, strictly in accordance with Section 6 of Rule 52, of the General Baggage Agents' "Rules" which have been approved by this Board, and which may be seen at each railroad station, and on the back of this sheet.

"Also this Board recommends that 'no board of health or health officer in Michigan should permit the disinterment and removal of the body of a person dead of diphtheria, small-pox, or scarlet fever, at any other season of the year than spring or summer (preferably in June or July) because there is much more danger of spreading these diseases in cold weather.' I think it would be better to defer the removal until June.

"There are some railroads in Michigan that will not accept of a body, dead from diphtheria, for shipment over their roads. This is true of the Lake Shore R. R., but I presume it is intended to remove the remains of Mr. Drury's four children to Kalamazoo by team.

"Herewith I send you a copy of the 'Work of Health Officers,' on pages 6 and 7 of which I have marked the requirements of this Office before a permit can be issued for the disinterment and removal of a body dead from diphtheria."

## PROPOSED DISINTERMENT OF A DEAD BODY IN HOPKINS TOWNSHIP, ALLEGAN COUNTY.

W. S. Campbell, clerk of Hopkins township, Allegan county, wrote to the Secretary of this Board, Dec. 22, 1893, relative to the disinterment of a dead body, as follows:—

"There is a family here who lost a daughter last September, and they buried her on the premises of her father. They now wish to remove the remains to the cemetery which is ½ mile distant. In going from their place to the cemetery they pass one house and a schoolhouse.

"She died with inflammation of the bowels. What will be the mode of proceeding? Will they require a permit from the board of health of this township, will you be kind enough to inform me?"

The following reply to Mr. Campbell's letter was sent from this Office on December 26, 1893:—

"Replying to your letter of Dec. 22, relative to the disinterment and removal of the remains of a 'daughter' of a family in Hopkins township, and reinterment in the cemetery. I infer that this burial is in Hopkins Tp., and that the removal and reinterment will all be in Hopkins Tp. If this is the case I should think that the persons interested had better get the permit of the health officer of Hopkins township, who should supervise the disinterment. If the body is to be removed into another township, they should first obtain the permit of the health officer of the township to which the body is to be removed.

"In any case I hope you and all who have to do with it will take great care in the disinterment, that no person, other than those absolutely necessary to perform the operation, shall be present, and that their clothing be not permitted to carry any contagium to other persons."

## TYROTOXICON SICKNESS IN MICHIGAN IN 1893.

During the year 1893 there were reported to the Secretary of the State Board of Health, 21 cases of tyrotoxicon sickness in Michigan.

The correspondence and other information relating to these cases is given below.

### *Poisoning by Buttermilk in Tekonsha Township, Calhoun County.*

Dr. J. L. Ramsdell, health officer of the village and township of Tekonsha, Calhoun county, in a weekly card-report for the week ending July 22, reported three cases of sickness from tyrotoxicon.

On receipt of this report Secretary Baker wrote to Dr. Ramsdell asking for full details relative to this subject, and asked if the poisonous substance was analyzed, and, if so, by whom it was done.

The following reply to this letter was received at this Office from Dr. Ramsdell, July 28:—

> "In reply to your request I will say that the poisonous substance was not analyzed; but I will give reason why I reported the cases as such. On Friday last I was called to see the cases. They were young adult Germans. The substance that contained the poison was butter-milk. They drank it about 10 A. M., and in about an hour and a half commenced to be sick. They were very weak and at first vomited terribly, later on there was purging, and one of the cases was completely prostrated when I arrived (5 miles in country), stools were involuntary, pulse rapid, weak and intermittent, face blanched, and still complaining of a good deal of pain in stomach and bowels. The other two were not so bad, and for the reason (as I thought) that they drank more of the butter-milk and commenced to vomit sooner.
>
> "Now in regard to the reason why I thought it was tyrotoxicon poisoning was this, the lady had churned on Monday and not again until Friday forenoon. The cream therefore had been saved for four days, the weather was hot, and probably the place in which the cream was kept was not very cool or the air very pure, as they were a German family that do not look after sanitary conditions much, and as further evidence, the members of the family had been drinking this milk when sweet without any deleterious effects, and I do not think there was any suspicion of any one having put poison into the milk. Any suggestion in regard to the case and treatment of such cases would be greatfully received."

### *Tyrotoxicon Poisoning in White Pigeon Village, St. Joseph County.*

The following is a copy of a letter received at this Office, Oct. 11, 1893, from J. R. Williams, M. D., health officer of White Pigeon village, St. Joseph county:—

> "Some two weeks ago, one D. W. Rank, a grocer of this place, bought at Adrian, a number of new cheeses. He cut and sold to a number of parties, all of whom were taken sick. My youngest patient was a child of three years, my oldest, a man aged thirty-six. All were attacked similarly, *not* immediately after eating of the cheese, but in each case from one to two hours *after*. Patients first taken with vomiting, no pain. In the course of an hour pain would begin, vomiting would continue, muscular cramps come on. Some sixteen ate of the cheese. All were sick. Each made good recovery. Mr. Rank sent the cheese back to Adrian (Chittenden & Co.) before I called on him, otherwise I should have destroyed the cheese."

### *Tyrotoxicon Poisoning in Alma Village, Gratiot County.*

In regard to a case of tyrotoxicon poisoning, the following letter from Dr. I. N. Brainerd of Alma village, Gratiot county, was received at this Office, Nov. 10, 1893:—

"The tyrotoxicon patient was a black man, aged about thirty-five. He bought and ate some cheese in St. Louis about one o'clock. A little after four, I saw him. He became sick in an hour or so, and had great difficulty in getting to Alma. He walked. Distance three and one-half miles. He was in great agony. I found him in a barber-shop. He was having griping pains, which he sought to relieve by rolling and doubling up on the floor. He purged and puked. His heart was very feeble, and he was so prostrated that he could scarcely walk. I gave him morphia and strychnia, and he was out the next day.

"I have heard nothing further from St. Louis. It is not likely, however, that my patient will be the only one.

"I feel sure of my diagnosis."

Nov. 10, the Secretary of this Board wrote to Dr. A. R. Wheeler, health officer of St. Louis city, Gratiot county, informing him of the report sent in by Dr. Brainerd, and asking if there were any cases of tyrotoxicon poisoning in the city of St. Louis or in the vicinity, and, if so, if he could send a sample of the cheese supposed to have caused the poisoning.

In reply to this letter, Dr. Wheeler stated that there were no cases of tyrotoxicon poisoning in St. Louis, or vicinity, and that he could find no trace of the poisonous cheese.

### *Tyrotoxicon Poisoning in Detroit.*

The following item appeared in the *Detroit Journal* of Dec. 13, 1893:—

"A sample of cheese was taken to Dr. Luther S. Harvey, food inspector for the board of health, one day last week. The doctor ate a little of it and experienced no bad effect. Yesterday he tried a chemical test, but he did not succeed in obtaining any reaction which would show the presence of a deleterious substance. Then he ate more. Not long afterwards he was attacked by violent pains of such a nature that he knew he was poisoned. He sent at once for Dr. Preston M. Hickey and betook himself to bed.

"During the greater part of the night Dr. Harvey's life was despaired of, but the remedies and care which Dr. Hickey gave him brought him through safely, and this morning he was out of danger, though very low from exhaustion."

Dec. 14, 1893, the Secretary of the State Board of Health wrote to Dr. L. S. Harvey, as follows:—

"I notice by the newspaper that you have been suffering from cheese poisoning. I trust you will soon be all right again. As soon as you are well enough to do so, and have investigated the subject, I should be glad to have you make a statement of the case, and give the results of the analysis or tests of the cheese if such an analysis or tests have been made.

"By mail I send you a copy of the 1890 Report of this Board, in which I have marked the article relative to tyrotoxicon poisoning. The Report for 1891 contains a much longer article, and I will send you a copy as soon as the Report is ready for distribution.

"W. H. Baxter, Fire Marshal, of Detroit, is kind enough to give to this Office every year a brief statement of the Casualties from Kerosene, Gasoline and Naphtha, and the Statement is used in compiling and writing an article on that subject for the Annual Report.

"Will it be practicable for you to supply me with a brief statement relative to cases of cheese poisoning which may come to your notice as food inspector, for publication in the article on this subject in the Annual Report of this Board?"

In reply to the Secretary's request Dr. Harvey said that he would furnish the particulars asked for provided the health officer and commissioner of Detroit, Dr. Duncan McLeod, would give his sanction to the same. Dr. Baker wrote to Dr. McLeod, January 19, 1894, stating what Dr. Harvey had written, and that he would be glad to have these facts from Dr. Harvey.

Dr. McLeod wrote in reply, Jan. 20, 1894, that he would instruct Dr. Harvey to prepare the desired paper on his experience with cheese poisoning.

The following report of Dr. Harvey's was received at this Office, Feb. 8, 1894, from Dr. McLeod:—

"I respectfully present the following report of poisoning by tyrotoxicon in cheese from which I suffered, and my subsequent investigations thereon:

"November 11, 1893, a sample of cheese was given me by you for analysis. It was from George Bawden, an employee of A. W. Frink & Co., commission merchants, who reported that the cheese from which it was taken had made several persons sick.

"Before beginning the analysis I visited Frink & Co. and made inquiry into the symptoms of the poisoning. Mr. Bawden, in whose family the poisoning occurred, was absent, but I was informed by Mr. Bailey, a member of the firm, that two or three persons had been made sick, that large quantities of the cheese had been eaten and that the sickness was not severe, consisting only of nausea and vomiting.

"I found that the sample that had been sent to you had been taken from a shipment of 13 cheeses received by Frink & Co. from J. H. Greene of Jasper, Mich. I gave explicit instructions not to sell any of the cheese nor to allow it to pass into other hands until the result of the analysis should be made known

"From the statement of the mild symptoms as reported by Mr. Bailey, I suspected the presence of copper or zinc sulphate, either of which is sometimes used to prevent "huffing".

"Tests for these metals proving negative, I began an analysis for tyrotoxicon.

"My experiments were interrupted however and could not be resumed until December 7th when I again visited Frinke & Co. to obtain a fresh sample of the cheese. I found that they had disposed of the entire lot to a cheese dealer in the market only the night before. I immediately visited the Central market stall and found that none had been sold; gave notice not to sell, and obtained a sample of what purported to be the same cheese from which the first sample was obtained.

"Not being satisfied with the tests obtained I decided to try the physiological test in connection with the chemical tests.

"I have neglected to state that Mr. Bailey had told me he had himself eaten a piece of the cheese 'as large as his hand' with no ill effects.

"On Saturday, December 9th, I weighed out and ate five grammes of the cheese at about 11 o'clock in the forenoon. I experienced no effect, except perhaps an increased appetite and unusual relish of my midday meal.

"Monday, December 11th, at about 11:30 a. m. I ate 10 grammes of the cheese cut from near the place from which I had taken the five grammes two days before. I took lunch at 12:30. At 2 p. m. I began to have some headache, with a sense of constriction at the temples and some nausea. Vomiting began at 2:30 after which there was some relief, followed in a half hour with more vomiting and an ordinary movement of the bowels.

"Occasional vomiting and retching continued, accompanied by an intense thirst. Beginning at 3:30 p. m. profuse watery stools passed at periods of about half-an-hour, followed each time by cold clamy perspiration. The increased weakness following each stool was very marked. A profuse watery stool, about 6 p. m. was followed by two fainting spells of short duration. After this I was taken in hand by Dr. Preston M. Hickey, whom I have requested to give a statement of the symptoms as observed by him after he took charge of the case. After my recovery I investigated the subject further and was informed by Mr. Bawden that two members of his family and one other out of five persons had been made very sick, with vomiting, purging and abdominal pains.

"I also found that a piece of the same cheese, weighing 13½ lbs. had been sold to Mr. John Boyle, a grocer on Grand River ave., and had not been reported to me by Mr. Bailey, he having claimed to have disposed of the entire lot to the cheese dealer in the Central market.

"From this source I was able to trace two cases of poisoning. C. H. Baker, a clerk in Mr. Boyle's store, reported having suffered nausea, vomiting and some diarrhea after having eaten some of the cheese, and a young man, Clyde Sheckell, employed in the Cass market was taken with nausea, vomiting and profuse watery stools, after eating some of the cheese in Mr. Boyle's store. Mr. Boyle claimed to have eaten a considerable quantity of the cheese at various times without any bad effects. Six-and-a-half pounds, about half the quantity of his original purchase, was still in his possession and was seized. He could give no account of the parties to whom he had sold the cheese, but had received no complaints.

"There were six cases of poisoning in all out of ten persons known to have eaten of the cheese. Individual susceptibility may to a certain extent explain the fact that some persons were more severly affected than others, while some were not affected at all.

"Aside from this I would advance the theory that the germ of which the tyrotoxicon is a ptomaine, finds the cheese substance a good culture medium, and that widely separated germs form colonies in whose neighborhood tyrotoxicon exists in great abundance, while other portions may remain free from the poison.

"In no other way can I explain the fact that in my own case five grammes caused absolutely no symptoms while ten grammes proved almost a lethal dose. Certainly the amount of poison contained in the two doses was not proportional.

"The tests used were: The formation of gold plates from the hot alcoholic solution of chloride of gold precipitate, and the orange red color of the purified tyrotoxicon extract with carbolic and sulphuric acid.

"The entire lot of cheeses were effectually disposed of, being confiscated and turned over to the garbage company and destroyed.

"The above, with Dr. Hickey's letter, comprises a full statement of all the facts in the case."

"*Office of Dr. Preston M. Hickey, 32 Adams Ave., W., Detroit, Mich.:*

"On December 11th I was called to see Dr. L. S. Harvey. I found the doctor lying on a lounge and the first glance convinced me he was seriously ill. Questioning him I learned he had been eating some cheese, as is stated in the account he has written.

"I urged him to go to bed at once and after a little hesitation he consented. Before doing so he went to the closet and while there fainted away twice, and upon getting him to his room he again fainted. His countenance was very pale, the pulse very weak, at times not perceptible at the wrist.

"Feeling quite alarmed I at once gave him a hypodermic of nitro-glycerine, 1-100 gr. This revived him him a little and he had, a few minutes later, an involuntary evacuation of the bowels. The passage consisted of thin mucous with shreds of tissue brightly colored with unclotted blood. The extremities were cold and the circulation impaired to the extent indicated by the feebleness of the pulse. As so long a time had elapsed since the eating of the cheese, and as there had been such a free cleaning out of the alimentary tract by emesis and purging, I thought if the period of depression could be tided over by the free use of stimulus, the nervous system would rally.

"As the effect of the nitro-glycerine was transient, I gave the doctor a hypodermic of strychnine sulphate, 1-30 gr. He was enveloped in hot blankets and rubbed vigorously. This had the effect not only of warming the extremeties but also of relieving the cramps of which the patient complained at times, referring them to his right leg. Periods of depression intervened at intervals of about 10 minutes at first, when there would be a partial loss of consciousness attended with a marked loss of cardiac power. At times hypodermic injections of brandy were administered with very gratifying results.

"Under this free use of stimuli the periods of depression became less frequent and the loss of nerve force less evident.

"As the patient slowly rallied he complained of intense thirst; this was accompanied by nausea.

"A general restlessness now manifested itself and for some time he tossed from side to side of the bed, being quiet only as the attacks of depression came on. Pain in the epigastrium was allieviated by counter-irritation. The pain continuing lower down the alimentary tract, tr. opii camph. was administered in drachm doses every half hour until this disappeared which it did after three doses.

"The subsequent treatment consisted in the administration of fluids in small quantities until the gastric membrane had regained its tolerance of larger amounts.

"(Signed) Preston M. Hickey, M. D."

Feb. 8, the following letter was sent to Dr. Harvey from Dr. Baker:—

"I have been interested in your report to the Health Commissioner of Detroit, relative to the poisonings which occurred last November, from the eating of cheese. I am very glad to have this report. But one or two statements are so indefinite that I would be glad if you could supply additional information as follows:—

"1. You say 'The tests used were: The formation of gold plates from the hot alcoholic solution of chloride of gold precipitate, and the orange red color of the purified tyrotoxicon extract with carbolic and sulphuric acid.' Does this mean that tyrotoxicon was proved to be present in the cheese by results as indicated above, in response to tests?

"2. How many cheeses were thus proved to contain tyrotoxicon?"

Feb. 9, Dr. Harvey replied to the above letter from Secretary Baker:—

"In reply to your inquiry of the 8th inst., received today, would state that:

"1. Tyrotoxicon was proved to be present in the cheese by results as indicated in the statement quoted, in response to tests.

"2. Three (3) cheeses were thus proved to contain tyrotoxicon.

"The presence of tyrotoxicon was first detected in the cheese which caused the poisoning. As the dealer represented that the cheeses were in two lots a sample of one of each lot was taken and analyzed with the result given above."

## TRICHINIASIS IN MICHIGAN IN 1893.

During the year ending December 31, 1893, there was received at this Office, information relative to an instance of trichiniasis at Vermontville village, Eaton county, which resulted in 5 cases of sickness.

The following notice was received March 7, 1893, from C. B. Snell, M. D., Health Officer of Vermontville village, Eaton county:

"There is a family sick here from eating ham in which Dr. Parmenter claims to have discovered trichina. I understand that the pig from which the ham was procured was raised here. Is there danger of its spread to other swine?"

In reply to the above, the Secretary sent the following letter March 7, 1893:

"Your card of recent date, relative to a family being sick from eating ham, is before me.

"Trichiniasis is spread by eating meat infected with trichinæ; and by thoroughly cooking the meat the parasite is killed. If the ham or the ham bone which has trichinæ is thrown out so that other hogs or rats can eat it the disease will probably be spread to other animals. All such waste or infected meat should be burned, or deeply buried. If one case of trichiniasis in an animal raised there has been discovered in a locality it is quite likely that there are other cases in existence; therefore, all such meat should be thoroughly cooked before being eaten.

"I should be glad to know just how many cases of trichiniasis there are, and any other information which you may be able to supply.

"I enclose a stamped envelope for your reply."

Upon receipt of the Secretary's letter Dr. Snell reported that the disease was confined to one family. Three of the patients having "apparently recovered" while the other two were "doing quite well."

March 7, 1893, the Secretary sent the following letter to William Parmenter, M. D., of Vermontville, Mich.:

"It has been reported to this Office that there have been several cases of trichiniasis in Vermontville, alleged to have been caused from eating ham; and that you were the attending physician in these cases.

"Will you kindly give me the number of cases which occurred, and any other facts which you may be able to supply this Office? Enclosed please find a stamped envelope for your reply."

Dr. Parmenter replied March 8, 1893, as follows:—

"In reply to yours of 7th inst. will state that in a family of eight persons, father, mother and six children, the latter ranging in age from about 13 to 2 years, five were taken sick within three days of each other during the last full week in February. The identity of the symptoms, viz: Diarrhea, nausea, loss of appetite, slight fever, muscular prostration out of proportion to other symptoms, *œdema* of *face* and *pain* in *voluntary muscles*, with insomnia in the adults, and sopor in the children, led to the diagnosis of trichiniasis. A microscopic examination of the pork (pickled) they had been eating since the 18th of

January discovered swarms of trichinæ. I have a specimen now in my office which has been seen by the physicians here and a multitude of citizens, which show them in great numbers. I cannot discover that the family have eaten of the pork in a raw state; but it is probable that it was imperfectly cooked at the time of the infection of the family.

"The names of the persons taken sick are, Mr. and Mrs. Fred Lentz, Emma (13), Charles (8) and Edith (5). Louisa (10), Louie (3), and Fred (2), did not eat the pork and did not contract the disease. Mrs. Lentz, Emma and Charles are apparently recovered, Edith is convalescent but Mr. Lentz is very sick. The invasion of new muscular feeding grounds of the parasites is progressing daily, and the consequent muscular prostration is extreme, in Mr. L.'s case.

"The hog was fattened in this village, and was, I am told, isolated in a pen from all others, and was a very fine appearing porker, weighing dressed 350 lbs."

Having received further information regarding this instance of trichiniasis poisoning, the Secretary sent the following letter to F. A. Weaver, M. D., Health Officer of Charlotte City, March 27, 1893:—

"I am informed that there is an outbreak of trichiniasis under your observation.

"Herewith I send you a stamped envelope. Will you kindly give all the facts you can relative to this outbreak?"

On March 28, 1893, Dr. Weaver replied as follows:—

"The cases of trichiniasis, 5 in number, occurred in Vermontville. I think Dr. Wm. Parmenter treated them. A sample of the pork was brought to me for analysis. I saw them in large numbers. I sent the pork to J. E. Clark, Detroit, 18 John R St., that he might analyze it and have a chance to show it to the students in the Detroit College of Medicine."

A day or two previous to the receipt of Dr. Weaver's letter the following communication was received from J. E. Clark, M. D., of the Detroit College of Medicine:—

"I am in receipt of some pork from Dr. F. A. Weaver, of Charlotte, Mich., which he forwarded to me with a request that I examine it for trichinæ. I had the meat double stained, and several sections made and mounted which brought out the trichinæ.

"As soon as the slides are hardened I will forward you a specimen."

## GLANDERS, AFFECTING ANIMALS, IN MICHIGAN IN 1893.

During the year ending December 31, 1893, there were reported to the Secretary of the State Board of Health two outbreaks of glanders in two localities. Three cases and no deaths were reported to have occurred in these outbreaks.

Below is given the correspondence between this Office and the local health officials relative to the above-mentioned outbreaks of glanders:—

### *Glanders (in a Horse) in St. Johns Village, Clinton County.*

The following postal was received, May 26, 1893, at this Office from J. B. Dodge, M. D., health officer of St. Johns village, Clinton county:—

> "A case of glanders has been reported to me. Have taken the necessary precautions and reported same to H. H. Hinds, Pres. of State Live Stock Com."

### *Glanders (Among Horses) in Reading Township, Hillsdale County.*

Aug. 26, 1893, the following letter was sent to this Office by J. C. Whitney, V. S., from Hillsdale city, Hillsdale county:—

> "I call your attention to a case which came to my place to-day. The history in connection with present symptoms are such as to make me suspicious of glanders. The horse is young, was traded for a year ago then suffering with distemper, discharge still present, schneiderian membrane ulcerated and sub-maxillary gland indurated. The horse standing by him has been discharging from one nostril for a few months, and the sub-maxillary gland on same side is also indurated. Both horses are in fair condition. I notified the owner of my suspicions, and advised him to isolate the horses; in the mean time I would notify the State Sanitary Board. The gentleman living in another town ten miles away I thought it best to notify you at once rather than pay any attention to the health officers of the town in which he lives."

Aug. 28, 1893, Secretary Baker wrote in reply to the above letter, as follows:—

> "Accept thanks for your letter of Aug. 26, relative to glanders in horses. We are unable to take such action as we should for the reason that you fail to give the name of the township in which the horses are owned. I trust that you have been more explicit in your notice to the State Live Stock Commission.
>
> "Will you have the kindness to give us the name of the township in which the horses are owned and the owner's name?"

The following reply to Secretary Baker's letter was received, Sept. 1, from J. C. Whitney, V. S.:—

> "Yours of the 28th, received. The name of the gentleman owning horses alluded to in my letter previously, is Harrison Yates, township of Reading, Michigan.
>
> "You will please pardon the blunder on my part, for notifying you instead of the Commission, but I had mislaid the copy of the act regulating disposition of such cases. The impression on my mind was that you were the proper one to notify. By being from home was prevented from answering your letter earlier. Will notify the Live Stock Commission by communicating with Prof. Grange."

Sept. 1, 1893. The Secretary of this Board notified Hon. H. H. Hinds, President of the State Live Stock Commission and Dr. J. W. Niblack, health officer of Reading township, Hillsdale county, of the contents of Mr. Whitney's letter; and wrote to Mr. Whitney as follows:—

"Accept thanks for your letter of Aug. 31, relative to glanders in some horses belonging to Harrison Yates of Reading township, Hillsdale county, Mich. I will immediately communicate with Dr. J. W. Niblack (Post Office, Reading, Mich.), relative to the subject, for the reason that he is the health officer of Reading township.

"You seem to have misconstrued the contents of my letter to you, of Aug. 28. Your notifying this office that glanders was under your observation, was proper, and I thank you for the information, but your failing to give the name of the owner of the horses or the name of the township in which they were, left me unable to take prompt action in the matter."

## HYDROPHOBIA (RABIES) IN MICHIGAN IN 1893.

During the year ending December 31, 1893, there were reported to the Secretary of the State Board of Health eight outbreaks of this disease, in the following-named localities in Michigan: Kalamazoo city; Climax village, Kalamazoo county; Sandstone township, Jackson county; Deerfield village, Lenawee county; Reese village, Tuscola county; Bingham township, Clinton county; Woodbridge township, Hillsdale county; Rich township, Lapeer county.

Details relative to the above-mentioned outbreaks are given as follows:—

### *Rabies in Kalamazoo City.*

A paragraph in the "Detroit Journal" of Feb. 9, 1893, relative to this outbreak, coming to the notice of the Secretary, he wrote, Feb. 13, 1893, to C. Van Zwaluwenburg, M. D., health officer of the city of Kalamazoo, asking information on the subject, as follows:—

"The following item is quoted from the Detroit Journal, Feb. 9, 1893:—

"'Kalamazoo, Mich., Feb. 8.—Special.—Within three days a dozen canines have been bitten by mad dogs in this city, and officers are instructed to kill all suspicious looking dogs. Six have already been killed. The valuable setter owned by W. Ripple is afflicted, and has attempted to bite several persons. The dog has gone in the vicinity of Galesburg and has not been captured.'

"Will you have the kindness to give me such information as you may be able to obtain on this subject?

"Enclosed please find a stamped envelope for your reply.

"Enclosed also find a copy of the 'Work of health officers and of local boards of health' in which I have marked that portion bearing upon hydrophobia or rabies, also the law relative to the action of the health officer or local board of health."

Feb. 14, 1893, the Secretary received the following reply from Dr. C. Van Zwaluwenburg:—

"In reply to your letter of Feb. 13, would say. We have had more or less rabies among dogs ever since last Aug. or Sept. At that time I reported the fact to your Secretary; and Mr. J. J. Woodman, of Paw Paw, of the State Live Stock Sanitary Com. was here in reply. He advised us how to deal with it and we have tried to control it the best we could.

"Every dog that looks suspicious is killed at once. The total killed is more than 25, perhaps 50. No symptoms have been observed in any other animals nor in man."

The Secretary wrote to C. Van Zwaluwenburg, M. D., Feb. 16, thanking him for his letter relative to the cases of rabies in the city of Kalamazoo.

### *Supposed Cases of Rabies at Climax Village, Kalamazoo County.*

The following letter from O. F. Seeley, M. D., written March 6, 1893, to Dr. R. McElrath, health officer of Climax, was forwarded to this Office:—

"I wish to call your attention to a supposed case of hydrophobia in the Howard neighborhood (south of us). A dog showing marked symptoms of the disease, bit several dogs, one cow and one horse. An immediate investigation should be made and prompt measures taken to protect the people."

Upon receipt of the above letter the Secretary of this Board wrote, March 8, 1893, to Dr. Robert McElrath, health officer of Climax township, as follows:—

"Accept thanks for * * * * for the letter from Dr. O. F. Seeley relative to * * * hydrophobia. Enclosed I send you a pamphlet with a paragraph marked treating upon the subject of hydrophobia. The local health officer should take prompt and thorough action to protect the people of his jurisdiction when a case of hydrophobia or rabies is present. The facts should also be reported to the State Live Stock Commission, of which Hon. H. H. Hinds (P. O. Stanton, Mich.), is president."

### *Rabies in Sandstone Township, Jackson County.*

The following letter dated May 15, 1893, was received at this Office from Prof. Delos Fall, of Albion, Mich., Member of the State Board of Health:—

"I have just heard of a case that seems to be of a serious nature and perhaps ought to be investigated. A mad dog went into a flock of sheep about 2 miles north of Parma and killed about twenty and bit several others. The latter have been going mad from time to time since. The worst feature of the case is that the owner of the sheep has taken the skins off and left the carcasses to lie on the ground to be the food of other dogs. One other dog has gone mad, and no one can say how many will do so in the future. Does this case belong to us or is it a case for the State Live Stock Commission?"

The Secretary wrote Prof. Delos Fall, May 16, 1893, as follows:—

"Please accept thanks for your letter of May 15, relative to the outbreak of rabies in the township of Parma. I immediately reported the facts to Hon. H. H. Hinds, President of the State Live Stock Commission, Stanton, Michigan, and communicated with the *health officer*, and with the *president* of the local board of health of the township of Parma. The local board of health should guard the public health from diseases dangerous to man, whether the disease be in animal or man."

The following letter was sent from this Office, May 16, 1893, to Hon. H. H. Hinds, President State Live Stock Commission, Stanton, Mich.:—

"It has been reported to this Office that 'A mad dog went into a flock of sheep about two miles north of Parma, and killed about twenty, and bit several others. The latter have been going mad from time to time. The worst feature of the case is that the owner of the sheep has taken the skins off, and left the carcases to lie on the ground to be the food of other dogs. One other dog has gone mad, and no one can say how many will do so in the future.' It was requested that this outbreak have immediate attention and I think the case is important so I place the matter before you immediately.

"It would seem to me that this is a serious condition of affairs, and I hope that it may receive attention, *as soon as possible.*"

May 16, 1893, the Secretary wrote the following letter to Dr. P. H. Bumpus, Health Officer of Parma township:—

"It has been reported to this Office that 'A mad dog went into a flock of sheep about two miles north of Parma, and killed about twenty, and bit several others. The latter have been going mad from time to time. The worst feature of the case is that the owner of the sheep has taken the skins off, and left the carcases to lie on the ground to be the food of other dogs. One other dog has gone mad, and no one can say how many will do so in the future.' It was requested that this outbreak have immediate attention, and I think the case important so I place the matter before you immediately.

"It would seem to me that this is a serious condition of affairs, and I hope that it may receive attention as *soon as possible.* By this mail I send you a pamphlet in which this subject is marked."

On the same date the Secretary sent a copy of the above letter to the Supervisor of the township of Parma and President of the Local Board of Health at Parma.

The health officer at Parma township, P. H. Bumpus, M. D., sent the following letter, May 18, 1893, to the Secretary of this Board:—

"I investigated about the sheep that were bitten on the farm of Gardner Hunn, north of this village. About fifty sheep have died and he had one shut up. He had buried all the bodies after removing the pelts therefrom. Quite a number of dogs have been killed.

"Last Sunday two boys were bitten by a dog belonging to Wm. Hammill. The wounds were cauterized and the dog killed.

"I knew about the sheep some time ago but did not know that the health officer had anything to do with it.* These sheep go wild and butt anything that comes in their way, until they become exhausted and then die within a few hours. They are located in the township of Sandstone, and the authorities there have been notified.

"I will endeavor to keep close watch of the matter and inform you of the result."

The following paragraphs appeared in the Detroit newspapers:—
Detroit Evening News, May 22, 1893:—

"JACKSON, Mich., May 22.—Between 60 and 70 sheep have died during the past few days in Parma township from rabies. Some days ago a dog belonging to J. Secord went mad and bit a number of sheep belonging to George Hunn. The dog was killed. Later the sheep developed rabies and have bitten others until wholesale hydrophobia has supervened among the flocks. A number of law suits will follow."

Detroit Free Press, May 22, 1893:—

"JACKSON, May 21.—(Special.)—A member of the State Board of Health visited Parma, this county, one day last week to investigate a hydrophobia epidemic in a number of flocks of sheep in that locality. About two weeks ago a mad dog belonging to Mr. Secord bit a number of sheep in a flock belonging to Gardner Hunn. The dog was killed, but the sheep were allowed to live, and they in turn have bitten others until some sixty or seventy have died from hydrophobia and others are afflicted with the malady. The people of Parma are considerably worked up over the affair, and endless litigation is likely to grow out of it. It is said the rabid dog bit several sheep belonging to two other flocks, but no serious trouble has been noticed among them as yet. The State health officer decided that nothing could be done, so far as his department was concerned."

The last statement in the above paragraph is incorrect; there are many things which can be done, and which are usually done by the office of the State Board of Health, which tend toward the restriction of rabies.

### *Rabies in the Village of Deerfield, Lenawee County.*

The following paragraph appeared in the Detroit Free Press of June 27, 1893:

"ADRIAN, June 26.—Word comes to this city of the prostration of Bertha Burnham, of Deerfield, with an attack of hydrophobia. Several weeks since she was bitten by a strange pug dog about the house, but as the wound healed nothing was thought of it. She is a young lady of 18, a very bright, winsome girl, and a graduate of the high school last week at Deerfield. She was in apparent good health Saturday, was at the store of her father during the forenoon acting as cashier for him and paid out over $1,100 for wool he had purchased. She was taken ill at noon, grew worse rapidly and at noon Monday her life was despaired of. It is one of the saddest events in Deerfield history."

Notice of the above article coming to this Office, the Secretary wrote to Webster Bliss, M. D., health officer of Deerfield village, June 27, 1893, asking information relative to this subject:—

"A dispatch from Deerfield to the Detroit Free Press, dated June 26, alleges that Bertha Burnham, of Deerfield was bitten by a strange pug dog several weeks ago. Wound healed and nothing thought of it. She was taken ill Saturday at noon, grew rapidly worse, and 'Monday noon her life was despaired of.' It is assumed that she is ill with hydrophobia.

"I would be pleased to hear from you by return mail relative to the subject. I trust that prompt action will be taken to prevent any further spread of rabies."

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*See pages 260-261, Report of this Board for 1890.

In reply to this letter, Dr. Bliss wrote, June 30, 1893:—

"Yours of June 27, received and contents noted.

"About the first of May last, Bertha Burnham was bitten by a strange dog. Her mother was fearful of consequences; father not. She was taken to Dr. McDonald, of Petersburg, the following day, who advised them to pay no attention to it. For some days previous to Saturday 24th of June, Miss Burnham had been very nervous. She was really very ill the morning of the 24th, but helped her father in his store until noon when she went home and to bed. She died of hydrophobia at 2 P. M., Monday."

On receipt of Dr. Bliss' letter the Secretary again wrote, July 1, 1893, as follows:—

"Accept thanks for your letter of June 30, relative to the death of Bertha Burnham of hydrophobia. I would be pleased to learn more of the particulars of the case. Especially would I be pleased to learn what became of the dog which bit the young lady, and where he came from, and who owned him,—if he had an owner. Who was Miss Burnham's attending physician? Please give me all the particulars which you can relative to the subject. I enclose herewith a blank 'K' for a final report, and trust that you will fill it out to the best of your ability."

July 6, the following reply was received from Dr. Bliss:—

"Yours of July 1st received and in reply will say that in so far as regards the dog that bit Miss Burnham nothing is known; he has not been seen or heard from since the day he bit her, which is a little strange.

"The physicians in attendance on Miss Burnham were Dr. N. D. Yale, Deerfield; Dr. McDonald, Petersburg; Dr. Wm. Scriber, Blissfield."

### *Hydrophobia Reported at Reese Village, Tuscola County.*

The Detroit Evening News of July 17, 1893, contained an article relative to a case of rabies at Reese village.

On July 18, the Secretary of this Board wrote to Dr. G. W. Walworth, health officer of the village, regarding this subject:—

"The following item appears in the Detroit Evening News of July 17:

"'Last spring Mrs. Edward Brown, of Reese, was bitten by a dog. For the past few days she has shown signs of hydrophobia. She froths at the mouth, barks like a dog, mews like a cat, scratches and tries to climb up the walls, and crawls on her hands and knees. It is said to be frightful to watch her actions.'

"I would be pleased to hear from you relative to the subject. I trust, if the item states the truth, that every effort will be made by you and your board of health to prevent the further spread of the disease."

No further particulars relative to this case were reported to this Office.

### *Rabies in Rich Township, Lapeer County.*

July 28, 1893, W. E. Brown, prosecuting attorney for Lapeer county, sent the following letter to the Secretary of the State Board of Health:—

"The health officer of the town of Rich in this county desires instruction under the following state of facts: About July 4, a dog in that township went mad and bit several dogs, a hog and a cow. The hog and cow have died of hydrophobia, and several of the dogs have shown symptoms of being mad and have been killed. The owner of two of the dogs that were bitten refuses to kill or chain up his dogs and allows them to run at large although notified that they had been bitten by the dog that bit the others and that he was mad at the time. He desires to know if there is any way that he can protect the community from the danger arising from these dogs running at large. Will you please address him, John N. Bindon North Branch, Mich., at once and tell him his duties in the case if he has any or give him instructions how the community may rid themselves of such dangerous animals."

The Secretary replied, July 29, 1893:—

"In compliance with your request of July 28, I have sent the health officer of Rich township, Mr. John N. Bindon of North Branch, full instructions relative to the duties of health officers and local boards of health in cases of rabies. The law is not quite specific, but I think the health officer should protect the public safety."

The following letter was sent July 29, 1893, from this Office to John N. Bindon, health officer of Rich township:—

"In compliance with the request of the prosecuting attorney of Lapeer county I send you by mail today a copy of 'the work of health officers and of local boards of health,' on pages 3, 4, and 6 of which I have marked parts bearing upon the subject of rabies. I also send you a copy of the 'Public Health Laws in force in Michigan in 1890,' on page 64 of which I have marked relative to its being the duty of the local *board of health* to investigate and immediately establish such temporary quarantine as may be necessary to prevent the spread of the disease. Act 137, Laws of 1883, provides that the health officer shall immediately investigate any disease dangerous to the public health, and order the prompt isolation of the sick or infected, so long as there is danger of the disease being communicated to persons. Under no circumstances should the local board of health fail to guard the public health and life from this fearful disease,—rabies.

"In compliance with sections 5 and 6 of Act 125, Laws of 1889, the facts should be promptly reported to the State Live Stock Commission, of which Hon. H. H. Hinds, of Stanton, is president. Whether in man or animal the disease should be promptly reported to the State Board of Health at Lansing.

"I should be glad to be informed of the exact facts in this case. Enclosed please find a stamped envelope for your reply."

Aug. 10, 1893, health officer, John N. Bindon, replied substantially as follows:—

A dog belonging to Mr. McIntire went mad and bit several dogs; among the number were two belonging to Mr. Randall. Being notified of this state of affairs, Mr. Randall refused to kill his dogs or even chain them up. The neighbors are very much frightened and keep their children indoors. "How long is there any danger after being bit?"

The Secretary of this Board replied, Aug. 11, 1893, as follows:—

"Accept thanks for your letter of August 10, relative to rabies.

"You ask, 'How long is there any danger after being bit?' A dog that has been bitten by a rabid dog is dangerous *so long as he is alive*, and he should be killed at the earliest oportunity. The period of incubation in rabies ranges between extremely wide limits; but the average period in any animal may be said to be from three to six weeks. Any animal that has been bitten by a dog suffering, or supposed to be suffering from rabies, should be killed, or if not killed, should be confined in such a manner as not to endanger other animals or the people, for *at least* forty-two days, that being the usual period of incubation.

"I enclose herewith a pamphlet, with a portion marked bearing upon the subject."

On the same date the Secretary wrote as follows, to Hon. H. H. Hinds, Stanton, President of the State Live Stock Commission, notifying him of the facts in this case of rabies:—

"John N. Bindon (P. O., North Branch, Lapeer county, Mich.) informs me this morning, by mail, that a dog owned by a Mr. McIntire of Rich township, Lapeer county, was attacked with rabies some time ago, that the dog had bitten several other dogs and a cow before he was killed, and that the owners of some of the dogs which were bitten refuse to allow them to be destroyed or to confine them. He says that the people are afraid to allow their children to go upon the streets. Mr. Bindon is the health officer of the township of Rich, Lapeer county.

"I think that this case is one which may involve danger to life unless the bitten animals are destroyed."

The following letter was received at this Office, August 22, 1893, from J. E. Barringer, Armada, Mich., member of the State Live Stock Commission:—

"Yours of August 11th inst., to H. H. Hinds, president of the State Live Stock Sanitary Commission, in matter of cases of rabies in Rich Tp., Lapeer Co., was referred to me by Mr. Hinds for action in the case; and would say that I have investigated the matter, and made such arrangements in the premises, that I think all cause for future danger is removed, and that there will be no further trouble"

### *Alleged Hydrophobia in Bingham township, Clinton County.*

The following paragraph appeared in the Lansing State Republican, August 17, 1893:

"Officer A. Huntoon will leave tomorrow to attend the funeral of his brother, Truman Huntoon, a farmer, living between here and St. Johns, who died of hydrophobia last evening. About three months ago Mr. Huntoon was attempting to give a dose of medicine to a sick hog and was prying open its mouth with a stick, when the stick slipped and the forefinger of the left hand struck one of the hog's teeth. The wound was very slight, being little more than a scratch, and healed rapidly, but about ten days ago he was taken sick, with all the symptoms of hydrophobia, and died in great agony last night. He was 56 years old and was a member of the masonic order and odd fellows. A wife and three children mourn his loss."

Upon receiving notice of the above item, the Secretary wrote, Aug. 18, 1893, to Dr. Henry Palmer, health officer of Bingham township, at St. Johns, Mich.:

"I am informed that a Mr. Huntoon who resided 'four miles south of the village of St. Johns,' died a day or two ago from a disease alleged to have been hydrophobia. I infer that he resided in your jurisdiction. Will you have the kindness to write to me, and to give me all the information you can collect relative to his illness and death? It is alleged that he was injured or bitten by a sick hog, which he was doctoring. I would be pleased to learn whether the hog was suspected of being afflicted with rabies, and if so, whether it had been bitten by some animal recently. Please give me as full a history as you can relative to this subject.

"If you were not the attending physician upon Mr. Huntoon, will you please give me the name and address of such physician, if you know?

"If Mr. Huntoon did not live in your jurisdiction, can you inform me where he did live?

"A stamped envelope is enclosed for your reply."

A letter dated Aug. 19, 1893, from A. O. Hunt, of St. Johns, was received at this office, stating that Dr. H. Palmer was out of town for a week, and that Dr. A. J. Wiggins was the attending physician in this case.

Aug. 28, 1893, Dr. H. Palmer replied as follows:

"Your communication of the 18th inst. came to hand in due time but have been absent till now.

"The case about which you write me, * * * was one of severe gastric disturbances or disease producing decided depression of the nervous system. In this case there was a *marked* general prostration.

"It is true that this man Huntoon was bitten by a hog last spring or winter, which died, but with the final sickness Mr. Huntoon presented none of the characteristic symptoms of hydrophobia; such as irritation of or reddening of the wound, no special aversion to the drinking of water and no spasms from deglutition of water or anything else.

"No delusions of any kind from first to last. I saw this patient three days before death and saw nothing to indicate hydrophobia, but everything to indicate the severest gastric disturbance and prostration of the nervous system.

"The attending physician was A. J. Wiggins of St. Johns, Mich., who can give you the full details that made him think that patient had hydrophobia, which he first called hog cholera."

The Secretary wrote to A. J. Wiggins, M. D., August 23, 1893:—

"I am informed that you were the attending physician upon Mr. Huntoon who resided 'four miles south of the village of St. Johns,' and who died about a week ago from a disease alleged to have been hydrophobia. Will you have the kindness to write to me, and to give me all the information you can collect relative to his illness and death? It is alleged that he was injured or bitten by a sick hog, which he was doctoring. I would be pleased to learn whether the hog was suspected of being afflicted with rabies, and if so, whether it had been bitten by some animal recently, or at any time. Please give me as full a history as you can relative to subject.

"A stamped envelope is enclosed for your reply."

The following is Dr. Wiggins' reply, dated Aug. 26, 1893:—

"In answer to yours of the 23d inst. respecting the death of Truman Huntoon, who died the 16th day of this month in Olive in this County, I would say, I treated Mr. Huntoon about two weeks just before and up to his death. That up to the second week I was unable to make a diagnosis satisfactory to myself. I was then told that in March last he was bitten on his right hand (index finger) by a young hog, while trying to give it medicine. The animal died soon after, of what was thought to be 'Hog Cholera.' There was no suspicion of rabies attached to the hog. Nor was it known that it had ever been bitten by any other animal. Before this case, I had treated three other cases of hydrophobia. One person was bitten by a skunk, another by a dog, while trying to part two dogs in a fight, and a third, a child by a kitten. The first patient made the peculiar squall of a skunk; the second barked; and the child would mew like a kitten; and Mr. Huntoon grunted and snorted like a hog. His was a pronounced and well marked case of violent hydrophobia. Another proof of this fact was his great aversion to the use of water or the presence of it, and further he at no time lost the control of his mental faculties. When he felt his paroxysms approaching he would request that he be tied or confined, saying he feared he might hurt those around him.

"Mr. Huntoon was about 56 years of age, of good constitution and health up to about three weeks before his death."

### *Rabies in Woodbridge Township, Hillsdale County.*

There was received at this Office, December 12, 1893, a letter from A. M. Ferguson, M. D., health officer of Woodbridge township, which reads as follows:—

"About the 10th of November, on the premises of George Woolf of Woodbridge Tp. there was a sow and pig bitten by a stray dog. About the 24th they showed that they had been infected with hydrophobia. Mr. Woolf, after consulting some of his neighbors, killed those hogs, and on the 7th of Dec. others of his hogs showed signs of the same infection. When the Board of Health was notified at a meeting on the 9th the stock on the farm was quarantined and a report made to the Live Stock Commission. The dog came from Cambria Tp. and crossed Woodbridge and into Amboy, where he was killed while chasing a cow. Several dogs are known to have been bitten both in Woodbridge and Amboy. What is the duty of the township board? Have they any right to recompense Mr. Woolf for his stock? We wait instructions."

The Secretary replied to Dr. Ferguson's letter Dec. 12, 1893, as follows:—

"Please accept cordial thanks for your letter of Dec. 11, relative to Rabies in Woodbridge township and vicinity.

"I send you by this mail a copy of the Public Health Laws in force in Michigan in 1890 and a copy of the pamphlet 'Work of Health Officers and of Local Boards of Health,' in which I have marked parts bearing upon the duties of the health officers, and also the State law relative to the appraisal and payment of live stock which has been killed by order of the State Live Stock Commission.

"Act 137 Laws of 1883, provides that the health officer shall immediately investigate any disease dangerous to the public health, and order the prompt isolation of the sick or infected so long as there is danger of the disease being communicated to persons. Under no circumstances should the local board fail to guard the public health and life from this fearful disease—rabies.

"I should be glad to be informed of the exact facts in this outbreak, and I enclose a stamped envelope for your reply.

"If this Office can be of further service to you, it will give me pleasure."

December 22, 1893, Dr. A. M. Ferguson again wrote to this Office:—

"Will you kindly favor us with your opinion of the enclosed notice in regard to the muzzling of dogs. It is a known fact that several dogs were bitten by the one that had Rabies. And the probability of others led the Local Board to request all dogs to be muzzled. There are certain would-be influential men who threaten the Board with prosecution should they attempt to enforce its action. Now if you will kindly state what our duty is in this matter; and if it is possible for State Board to sanction the action of the Local Board.

"Please reply in that way that it may be published in county papers.

"Will send a full account of this outbreak of Rabies when fully collected."

The following is a copy of the notice mentioned in the foregoing letter:—

"*Mad Dog.*"

"Notice is hereby given that all dogs in the Township of Woodbridge must be muzzled for six months from the 20th day of December, 1893. All dogs found running at large unmuzzled after said date will be destroyed.

"By order of Woodbridge Board of Health."

The following is a copy of the Secretary's reply to Dr. Ferguson's letter:—

"Replying to your letter of Dec. 22,—you ask a question of law which could best be answered by the Prosecuting Attorney of Hillsdale county. However, the following may be useful to you.

"I send herewith a pamphlet, on page seven of which I have marked sections of law relative to making and publishing *regulations.* I do not believe the printed *notice*, which you send, would hold in law. The law provides that a local board shall make such 'regulations' as they may deem necessary for the public health and safety, respecting any articles which are capable of containing or conveying infection or contagion, or of creating any sickness, and provides a penalty for the violation of such regulation. The law provides also that the local board *shall give notice by publishing such regulation* in some newspaper in the township, if there be one published therein, and if not, then by posting them up in five public places. I don't believe your notice complies with the law, inasmuch as it does not give the regulation, does not provide who shall do the killing, and other details.

"If you have any additional facts relative to this outbreak of Rabies in Woodbridge Tp. I should be glad to get them. Has any person been bitten? Have new cases of rabies occurred? Are there any now?"

The following letter was sent from this Office, Dec. 26, 1893, to Dr. Charles E. Payne, health officer of Cambria township, relative to this outbreak of rabies:—

"This Office has received information that 'About the 10th of November on the premises of George Woolf of Woodbridge Tp. there was a sow and pig bitten by a stray dog. About the 24th they showed they had been infected with hydrophobia. Mr. Woolf after consulting some of his neighbors killed those hogs and on the 7th of Dec. others of his hogs showed signs of infection. When the Board of Health (Woodbridge Tp.) was notified at a meeting Dec. 9th, the stock on the farm was quarantined and a report made to the live stock commission. The dog *came from Cambria Tp.* and crossed Woodbridge and into Amboy where he was killed while chasing a cow. Several dogs are known to have been bitten both in Woodbridge and Amboy.'

"Enclosed please find an envelope for your reply. Will you have the kindness to give me the exact facts in this outbreak of Rabies so far as relates to Cambria, and whether or not there are any cases of rabies existing in Cambria township at present? Were there other animals bitten in Cambria? Was any person bitten?"

The following reply from Dr. C. E. Payne, Dated Jan. 2, 1894, was received at this Office:—

"The stray dog that caused the disturbance in Woodbridge and Amboy did not do any damage in Cambria township so far as yet learned."

A copy of the letter sent to Dr. C. E Payne, was also sent to E. C. Davis, health officer of Amboy township, but no reply was received.

## LUMP-JAW (ACTINOMYCOSIS) IN MICHIGAN IN 1893.

During the year 1893 there was one case of this disease reported to this Office. Simon Hosbein, Jr., of the village of Coloma, Berrien county, wrote, Nov. 7, 1893, relative to this case as follows:—

"I have an ox affected with lump-jaw, and thinking probably there was some provision in the law of this State by which I would have it ordered shot, or killed, and probably getting paid for same, it having been pronounced contagious by an ex-member of the board of health of this township, who also referred me to you. Said ex-member also pronounced it a case of rare occurrence in this State.

"Please let me know if the law provides for payment in such cases, and especially for said disease."

In reply to Mr. Hosbein's letter, the Secretary of this Board wrote as follows, Nov. 8, 1893:—

"Your letter of Nov. 7, 1893, relative to a case of lump-jaw, is before me, for which accept thanks.

"You should immediately report this case of lump-jaw to the president of the State Live Stock Commission, Hon. H. H. Hinds, Stanton, Michigan.

"Replying to your question relative to the killing of this animal, I send you by mail a copy of the Stanton Sanitary Convention, in which I have marked the law bearing upon that subject. I have also marked the part bearing upon Actinomycosis or lump-jaw. The manner and mode of treatment of this disease are fully set forth in Bulletin No. 2, of the Department of Agriculture, Bureau of Animal Industry, and you can probably get a copy of this bulletin by addressing the Department of Agriculture, Bureau of Animal Industry, Washington, D. C.

"I doubt very much whether an animal affected with lump-jaw would be considered valuable. You would be able to have the ox killed; but I doubt if you receive pay for the ox."

# INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO HAVE BEEN CAUSED BY THE USE OF KEROSENE, IN MICHIGAN, DURING THE YEAR ENDING DECEMBER 31, 1893.

Continuing a practice pursued in previous years, the office of the Secretary of the State Board of Health, has, during the year 1893, sought to obtain information relative to each casualty, alleged to have been caused by the use of kerosene, which came to the notice of said office.

The principal sources from which this office obtains facts in regard to such casualties as above mentioned, are four, viz.: from reports by the Fire Marshal of Detroit, State Inspectors and Deputy Inspectors of Illuminating Oils, Local Health Officers, and from newspaper reports. Relative to the last of these sources of information, it should be stated that the Secretary of this Board does not accept as necessarily authentic, newspaper reports of casualties from the use of kerosene. When such reports come to his knowledge, he applies to the proper officials of the localities in which they are said to have occurred, for confirmation or contradiction of the reports, and for any information which these officials may be able to give in connection with the alleged casualties. A copy of the form of letter used on such occasions, is given in the Annual Report of this Board for the year 1892, page 334. The data collected from these sources, show that during the year 1893, information was received at this office, of the occurrence of 83 casualties consequent on the use of kerosene in Michigan. These casualties were reported to have occurred in 11 localities, causing loss of 2 lives, injury (non-fatal) to 8 persons, and damage of property to the amount of $49,500.

This reported damage does not include all the actual pecuniary loss occasioned by the above-mentioned casualties, because in very many instances where houses, barns and other property were destroyed the loss was not reported.

TABLE 1.—*Casualties in Michigan during the year 1893, believed to have been consequent on the use of Kerosene, information of which was received at the Office of the Secretary of the State Board of Health. In the first six months of this year the legal test was a Burning Test at 120 degrees Fah., in an open tester. In the last six months the legal test was a Flash Test at 120° Fah., in a Foster Automatic Tester.*[*]

| | Number of Casualties. | Number of Localities. | Pecuniary losses. Dollars. | Lives lost. | Persons injured (not fatally). |
|---|---|---|---|---|---|
| In Detroit | 71 | 1 | 39,494 | 0 | 1 |
| In State (outside Detroit) | 12 | 10 | 10,006 | 2 | 7 |
| Totals. | 83 | 11 | 49,500 | 2 | 8 |

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[*] In 1893, the legal test of kerosene, for illuminating purposes, was, by legislative enactment (Section 2, Act 94, Public Acts of 1893) made as follows: "It shall be the duty of the inspector and his deputies to provide themselves at their own expense with the necessary instruments and apparatus for testing the quality of said illuminating oils, and when called upon for that purpose to promptly inspect all oils hereinbefore mentioned, and to reject for illuminating purposes all oils which will emit a combustible vapor at a temperature of one hundred and twenty degrees of Fahrenheit's thermometer: *Provided*, The quantity of oil used in the flash test shall not be less than half pint. The oil tester adopted shall be the Foster automatic tester cup, with the lighted wick placed inside the tube, and under the thimble which shall be used by the inspector and his deputies." Act 94 became operative July 1, 1893.

TABLE 2.—*Exhibiting the numbers of casualties believed to have been consequent on the use of Kerosene* in Michigan (*including the city of Detroit*), *information of which was received at the office of the Secretary of the State Board of Health in each of the five years, 1889–1893. In the years 1889, 1890, and the first half of 1891, the legal test was a Flash test at 120 degrees Fah., in a closed tester; and in the last half of 1891, in 1892 and the first half of 1893, it was a Burning test at 120 degrees Fah., in an open tester, which, because it varies greatly, is equal to a Flash test of from 95 to 110 degrees Fah., probably averages about equal to a Flash test of 100 degrees Fah., in a closed tester, like the one approved by the State Board of Health. The last half of 1893, the legal test was a Flash test at 120° Fah. in the Foster Automatic Tester, which has not been approved by the State Board of Health.*

| Year. | Number of Casualties. | Amount of damage done, Dollars. | Number of Lives lost. | Number of Casualties caused by Lamp explosions. | Number of Casualties caused by Stove explosions. |
|---|---|---|---|---|---|
| 1889 | 53 | * 74,049 | 8 | 16 | 2 |
| 1890 | 55 | 18,282 | 2 | 22 | 6 |
| 1891 | 148 | 52,828 | 11 | 93 | 8 |
| 1892 | 134 | 66,000 | 7 | 75 | 17 |
| 1893 | 83 | 49,500 | 2 | 43 | 15 |

* The total reported damage ($74,049) for 1889 includes $40,000 damage caused by a single fire at 678 Jefferson street, Detroit. This fire was caused by a careless manipulation of an oil heater used for heating a conservatory, and "was not the result of the grade of the oil used."

TABLE 3.—*Exhibiting the numbers of casualties believed to have been consequent on the use of Kerosene in* Detroit *during each of the years, 1889–1893.* (*Reported by the Fire Marshal of Detroit to the Office of the State Board of Health.*) *In the years 1889, 1890, and the first half of 1891, the legal test was a Flash test at 120 degrees Fah., in a closed tester, and in the last half of 1891, 1892 and the first half of 1893 it was a Burning test at 120 degrees Fah., in an open tester, which, because it varies greatly, is equal to a Flash test of from 95 to 110 degrees Fah., but probably averages only about equal to a Flash test of 100 degrees Fah. in a closed tester. The last half of 1893 the legal test was a Flash test of 120 degrees in a Foster Automatic Tester Cup.*

| Year. | Number of Casualties. | Amount of damage done, Dollars. | Number of Lives lost. | Number of Casualties caused by Lamp explosions. | Number of Casualties caused by Stove explosions. |
|---|---|---|---|---|---|
| 1889 | 35 | * 65,250 | 3 | 14 | 2 |
| 1890 | 44 | 18,282 | 0 | 15 | 6 |
| First six months of 1891 | 14 | 2,878 | 0 | 9 | 2 |
| Last six months of 1891 | 41 | 9,760 | 2 | 26 | 5 |
| Total for year 1891 | 55 | 12,638 | 2 | 35 | 7 |
| 1892 | 79 | 39,306 | 2 | 37 | 13 |
| First six months of 1893 | 37 | 20,958 | 0 | 19 | 10 |
| Last six months of 1893 | 34 | 18,536 | 0 | 19 | 5 |
| Total for year 1893 | 71 | 39,494 | 0 | 38 | 15 |

* The total reported damage (65,250 dollars) for 1889 includes, $40,000 damage caused by a single fire at 678 Jefferson street. The fire was caused by careless manipulation of an oil heater used for heating a conconservatory, and "was not the result of the grade of the oil used."

TABLE 4.—*Exhibiting the numbers of casualties believed to have been consequent on the use of Kerosene* in Michigan (*including the city of Detroit*), *information of which was received at the office of the Secretary of the State Board of Health in each of the five years, 1889–1893. In the years 1889, 1890, and the first half of 1891, the legal test was a Flash test at 120 degrees Fah., in a closed tester; and in the last half of 1891, in 1892 and the first half of 1893 it was a Burning test at 120 degrees Fah., in an open tester, which, because it varies greatly, is equal to a Flash test of from 95 to 110 degrees Fah., but probably averages only about equal to a Flash test of 100 degrees Fah., in a closed tester. For the legal test in the last half of 1893, see foot-note to Table 1, of this article.*

| Year. | Number of Casualties. | Amount of damage done, Dollars. | Number of Lives lost. | Number of Casualties caused by Lamp explosions. | Number of Casualties caused by Stove explosions. |
|---|---|---|---|---|---|
| 1889 | 53 | † 74,049 | 8 | 16 | 2 |
| 1890 | 55 | 18,282 | 2 | 22 | 6 |
| First six months of 1891 | * 30 | 10,778 | 2 | * 19 | 2 |
| Last six months of 1891 | * 118 | 42,050 | 9 | * 74 | 6 |
| Total for year 1891 | 148 | 52,828 | 11 | 93 | 8 |
| 1892 | 134 | 66,106 | 7 | 75 | 17 |
| First six months of 1893 | 43 | 25,958 | 0 | 21 | 10 |
| Last six months of 1893 | 40 | 23,542 | 2 | 22 | 5 |
| Total for year 1893 | 83 | 49,500 | 2 | 43 | 15 |

* Included in these numbers are data relative to 27 reported casualties in 1891, of which the exact dates of occurrence were not reported. In order to make an equitable distribution of these between the first and last halves of the year a proportionate division of them is made, based on the data contained in Table 2 of this article, thus: Table 2 shows that, *exclusive* of the above-mentioned 27 casualties, there were reported 121 casualties in the State, in 1891; that 24 (about 20 per cent) of these, occurred in the first half of the year, and 97 (about 80 per cent) occurred in the last half of the year. The 27 casualties, the dates of which are not given, are divided between the first and last halves of the year in the same proportion, that is, 20 per cent of them are added to the first half, and 80 per cent to the last half of the year.

† The total reported damage ($74,049) for 1889 includes, $40,000 damage caused by a single fire at 678 Jefferson street, Detroit. The fire was caused by a careless manipulation of an oil heater used for heating a conservatory, and "was not the result of the grade of the oil used."

## *Casualties from the Use of Kerosene in 1893 Compared with Previous Years.*

The foregoing three tables (2, 3 and 4), based, for 1893, on the data from which table 1 in this article is constructed, and for 1889, 1890, 1891 and 1892 on similar data for those years, are designed to facilitate comparison of the numbers of casualties and resultant damage, which occurred in the State from the use of kerosene during those years.

The following lists of casualties show the localities in which the casualties occurred, the nature of each casualty, the damage caused thereby, and whatever other details in regard to them this Office has been able to collect.

*List of Casualties consequent on the use of Kerosene in Michigan outside the city of Detroit, calendar year 1893.*

| Date in 1893. | Locality. | Nature of Casualty. | Amount of Damage. | Injury to Person. |
|---|---|---|---|---|
| Jan. 23 | Lansing city | Lamp upset, house burned | $1,000 | |
| Feb. 8 | Berrien Springs | Lamp dropped in dry goods store | 4,000 | |
| " " | Otisco township | Lighted lantern caused explosion of gas | ........... | Man slightly burned. |
| Mar. 5 | Lansing city | Lamp exploded | ........... | Woman severely burned. |
| Apr. 1 | Vevay township | House ruined, caused by lamp. | | |
| June 1 | Lansing city | Lamp exploded | ........... | Four persons seriously burned. |
| July 13 | St. Clair city | Lamp upset | 6 | |
| July 21 | Sparta village | Man fell and lamp which he carried was broken. | | |
| Aug. 14 | Saginaw | Lamp exploded | 3,000 | |
| Aug. 18 | Pavilion township | Lantern exploded, barn and contents burned | 2,000 | |
| Aug. 22 | Opechee | Supposed lamp explosion, house burned | ........... | Two children fatally burned. |
| Oct. 23 | Albion city | Oil poured in stove, oil in can exploded | ........... | Woman badly burned. |

*List of Casualties consequent on the use of Kerosene, in Detroit, Calendar Year, 1893.*
*(Supplied by William H. Baxter, Fire Marshal in Detroit.)*

| Date in 1893. | Street and Number. | Nature of Casualty. | Amount of Damage. | Injury to Person. |
|---|---|---|---|---|
| Jan. 1 | 415 Hastings St. | Lamp exploded | $336 | |
| Jan. 8 | 44 Elizabeth St. | Stove exploded | 38 | |
| Jan. 6 | 723 Third St. | Lamp exploded | 103 | |
| Jan 7 | 70 Catherine St. | Stove exploded | 50 | |
| Jan. 8 | 920 Jefferson | Stove exploded | 30 | |
| Jan. 10 | 328 Abbott | Stove exploded | 1,400 | |
| Jan. 13 | 807 Jefferson | Stove exploded | 1,000 | |
| Jan. 15 | 1291 Michigan | Stove exploded | ........... | |
| Jan. 17 | 41 Monroe | Stove exploded | ........... | |
| Jan. 26 | Cass and Fort | Lamp ignited gas | ........... | Man severely burned. |
| Jan. 29 | 356 Hastings | Lamp exploded | 1,129 | |
| Feb. 7 | 918 Jefferson | Lamp exploded | 850 | |
| Feb. 8 | 259 " | Lamp exploded | 574 | |
| Feb. 28 | 42 Larned west | Stove filled while burning. | 10 | |
| Feb. 29 | 683 Michigan | Lamp exploded | 2,175 | |
| Mar. 1 | 512 Hastings | Lamp fell | 57 | |
| Mar. 2 | 206 Third | Lamp too close to clothing | 39 | |
| Mar. 2 | 979 Michigan | Lamp exploded | 4,691 | |

*List of Casualties consequent on the use of Kerosene in Detroit.*—CONTINUED.

| Date in 1893. | Street and Number. | Nature of Casualty. | Amount of Damage. | Injury to Person. |
|---|---|---|---|---|
| Mar. 7 | 399 Fourth | Stove exploded | $50 | |
| Mar. 8 | 36 Chipman | Lamp exploded | 10 | |
| Mar. 9 | 127 Brush | Stove exploded | | |
| Mar. 9 | 537 Seventh | Stove collapsed | 10 | |
| Mar. 17 | 336 E. Congress | Stove upset | 246 | |
| Mar. 20 | 174 Woodward | Stove upset | | |
| Mar. 23 | 821 First | Lamp exploded | 1,981 | |
| Mar. 25 | 320 Rowena | Lamp too close to hay in barn. | 91 | |
| Mar. 26 | 1574 Chene | Lamp exploded | 193 | |
| Mar. 30 | 352 Third | Lamp exploded | 525 | |
| April 10 | 588 Howard | Lamp exploded | 600 | |
| April 11 | 25 Wilkins | Lamp exploded | 125 | |
| April 27 | 951 Michigan | Stove exploded | 1,759 | |
| April 28 | 84 " | Lamp exploded | 701 | |
| May 23 | 596 Baker | Lamp exploded | 563 | |
| May 24 | 590 Baker | Lamp exploded | 461 | |
| June 1 | 361 Gratiot | Lamp exploded | 690 | |
| June 3 | 129 Benton | Lamp exploded | 393 | |
| June 25 | 944 Hubbard | Lamp exploded | 75 | |
| July 1 | 95-99 Jos. Campau | Lamp upset | 731 | |
| July 10 | 197 Maybury | Stove exploded | 15 | |
| July 13 | 365 Hastings | Stove exploded | 70 | |
| July 22 | 286 Second | Stove exploded | 1,153 | |
| July 27 | 751 Riopelle | Kindling fire with kerosene | 43 | |
| July 28 | 440 Twenty-third | Lamp exploded | 195 | |
| July 31 | On tug boat | Lamp upset | 1,520 | |
| Aug. 14 | 386 Twelfth | Careless use of kerosene in barn. | 400 | |
| Aug. 21 | 33 Lafayette | Lamp exploded | 1,161 | |
| Sept. 6 | 103-107 Leland | Lamp exploded | 1,003 | |
| Sept. 15 | 417-19 Howard | Lamp exploded | 180 | |
| Oct. 2 | 157 Grand River | Lamp exploded | 2,132 | |
| Oct. 2 | 84 Clinton | Lamp exploded | 10 | |
| Oct. 3 | 483 Alexandria E. | Lamp exploded | 1,261 | |
| Oct. 19 | 192 Pine | Lamp exploded | 3,500 | |
| Oct. 20 | 278 Monroe | Lamp exploded | 268 | |
| Oct. 23 | 27 Adams Ave., east | Stove exploded | 150 | |
| Nov. 1 | 1028 Fourth Ave. | Lamp upset | 25 | |
| Nov. 2 | 260 Mt. Elliot Ave. | Lamp exploded | 677 | |
| Nov. 8 | 82 Sullivan Ave. | Lamp fell | 5 | |

*List of Casualties consequent on the use of Kerosene in Detroit.*—CONCLUDED.

| Date in 1893. | Street and Number. | Nature of Casualty. | Amount of Damage. | Injury to Person. |
|---|---|---|---|---|
| Nov. 22 | 20 Houghton | Lamp exploded | $1,050 | |
| Nov. 23 | 646 Buchanan | Lamp exploded | 300 | |
| Nov. 27 | 1579 Gratiot | Lamp exploded | 110 | |
| Dec. 5 | 259 Twelfth | Careless use of lamp | 212 | |
| Dec. 8 | 437 Hastings | Lamp exploded | 270 | |
| Dec. 11 | 336 Fifteenth | Lamp exploded | 411 | |
| Dec. 13 | 1214 Chene | Lamp fell | 300 | |
| Dec. 15 | 960 Cass | Stove exploded | 100 | |
| Dec. 17 | 16 St. Clair | Lamp exploded | 95 | |
| Dec. 27 | 304 Linden | Lamp exploded | 421 | |
| Dec. 27 | 225 Pitcher | Lamp upset | 10 | |
| Dec. 27 | 253 Second | Lamp exploded | 139 | |
| Dec. 28 | 186 Wilkins | Lamp exploded | 170 | |
| Dec. 31 | 131 Twenty-eighth | Lamp too close to ceiling | 452 | |

Table 2, in which the data contained in tables 3 and 4 are combined, shows that in the *State, including* the city of Detroit, there were reported to have occurred 83 casualties, resulting in pecuniary losses amounting to $49,500.00, and the loss of lives of 2 persons. Forty-three (about 52 per cent) of these casualties were attributed to lamp and lantern explosions, and fifteen (over 18 per cent) to oil-stove explosions.

The remaining 25 casualties were attributed to other causes as follows:—Lamps upset, 7; fallen lamps, 4; gas exploded by burning lamp and lantern, 2; broken lamp, 1; oil poured into burning stoves, 2; lamp held too close to clothing, 1; stoves upset, 1; stove collapsed, 1; lamp placed too close to hay in barn, 1; kindling fire with kerosene, 1; lamp placed too near ceiling, 1; other careless usage of kerosene, 3.

In tables 3 and 4, the years 1891 and 1893 are divided into two parts, one comprising the first six months and the other the last six months of those years. The reason for this division is, that the laws regulating the legal test of kerosene in the State were, by legislative enactment, changed during those years, the new laws becoming operative on July first of each of those years. This arrangement of tables 3 and 4, therefore, gives opportunity not only for comparison of the prevalence of casualties in 1891 and 1893 with the other years; but also of the comparative prevalence of casualties in the first and last halves of 1891 and 1893, under the provisions of the old and new test laws.

In 1889, 1890 and the first six months of 1891, the legal test of kerosene in this State was a *Flash* test at 120 degrees Fah. in a *closed* tester, approved by the State Board of Health; that is, that the sale and use of oils which, in a *closed* tester, similar to a lamp, would emit an explosive vapor at a temperature lower than 120 degrees Fah. was prohibited. The law, which took effect July 1, 1891, made the legal test a *Burning* test at 120 degrees Fah. in an *open* tester, not approved by the State Board of

Health. That is, the law of 1891 prohibited only the sale of kerosene which would *burn* in an *open* tester at a lower temperature than 120 degrees Fah. As kerosene will emit an explosive vapor at a much lower temperature than that at which it will continue to burn in the open air where the vapor is carried away as fast as formed, and because of the variations in tests in an *open* tester, dependent on varying atmospheric currents and conditions, it is believed that the new *burning* test, at 120 degrees Fah. would probably average not more than equal to a *Flash* test at 100 degrees Fah. in a *closed* tester, like the "State Board of Health Tester." That is to say, that an oil which would burn at a temperature of 120 degrees Fah. in an *open* tester, would probably, when heated to a temperature of 100 degrees Fah. in a *closed* tester, emit explosive gas which would flash; although the same oil if heated in an *open* tester, might, under some conditions, not flash at a temperature lower than 110 degrees Fah.

In a series of 64 experiments made by Dr. R. C. Kedzie,* with kerosene obtained from various sources, it was found that oils, the average *burning* temperature of which was 128 degrees Fah., *flashed* at an average temperature of 117 degrees Fah. Based on the same proportion, oils which would *burn* at 120 degrees Fah. would emit explosive gas which would *flash* at a temperature of 109.7 degrees Fah.

Experiments made by Prof. Chandler† to ascertain the temperature of kerosene in lamps after they had been burning a number of hours, showed that in one instance he found the temperature 120 degrees, in another 118 degrees, and in another 104 degrees; an average temperature for the three instances of 114 degrees, which is 4.3·degrees higher than the average *flashing* point of oils, the average *burning* point of which is 120 degrees Fah. These experiments seem to show that oil in burning lamps sometimes attains a higher temperature than the *flashing* point of oils, whose *burning* point is 120 degrees Fah. It would therefore seem that oils which would meet the requirements of the Michigan legal test, established in 1891, may, in burning lamps, attain a higher temperature than that at which they would emit explosive gas, and are, therefore, dangerous; for, no oil can be considered safe for illuminating purposes which will give off an inflammable vapor at the highest temperature reached in lamps. This assumption—based upon experiments—that oils passing this legal test are unsafe, seems to be demonstrated by actual experience collected in tables 3 and 4, which show, both in the city of Detroit and in the whole State, that there was a large increase in the number of casualties from the use of kerosene in 1891 and 1892 over 1890, and that as regards 1891 this was caused by the increase in the number which occurred in the last half of that year.

The Legislature of 1893, realizing that illuminating oils which would pass the legal test established by the Legislature of 1891, were unsafe, and a menace to the lives and property of the citizens of the State, enacted a new law (Act 94, Public Acts of 1893), which appeared to, but did not actually re-establish the legal test in force prior to the change in 1891. Instead of requiring the test to be made in a "State Board of Health Tester," the law requires it to be made with a patent tester, through which a current of air is caused to pass, over a lighted taper, thus distilling off vapor so gradually that the oil does not flash at as low a temperature as the same oil would in a "State Board of Health Tester." Section 2 of this law, which became operative July 1, 1893, reads as follows:—

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* Published in the First Annual Report for 1873, of the Secretary of the Michigan State Board of Health, pages 44 and 45.

† First Annual Report, for 1873, of the Secretary of the Michigan State Board of Health, page 55.

"SEC. 2. The State Inspector provided for in this act is hereby empowered to appoint a suitable number of deputies: *Provided*, That the number of said deputies so appointed shall not exceed twenty-two, which deputies are hereby empowered to perform the duties of inspection and shall be liable to the same penalties as the State Inspector: *Provided*, That the State Inspector may remove any of said deputies for reasonable cause. It shall be the duty of the inspector and his deputies to provide themselves at their own expense with the necessary instruments and apparatus for testing the quality of said illuminating oils, and when called upon for that purpose to promptly inspect all oils hereinbefore mentioned, and to reject for illuminating purposes all oils which will emit a combustible vapor at a temperature of one hundred and twenty degrees of Fahrenheit's thermometer: *Provided*, The quantity of oil used in the flash test shall not be less than half pint. The oil tester adopted shall be the Foster automatic tester cup, with the lighted wick placed inside the tube, and under the thimble which shall be used by the inspector and his deputies."

### PERSONAL INJURIES CONSEQUENT ON THE USE OF KEROSENE.

The following extracts from correspondence of this office, and from newspaper items, which came to the notice of the Secretary of this Board, give in detail the circumstances connected with some of the casualties from the use of kerosene, which resulted in loss of human life and other personal injuries to citizens of this State in 1893:—

#### *Two Children Fatally Burned by Kerosene in Osceola Township.*

The following paragraph appeared in the "Detroit Evening News" of Aug. 22, 1893:—

"Henry and John Manli, of Osceola, Houghton county, aged 3 and 2 respectively, were burned to death by a lamp explosion."

Aug. 23, 1893, the usual letter of inquiry relative to similarly reported casualties, was sent to Dr. A. I. Lawbaugh, health officer of Osceola township. In reply Dr. Lawbaugh wrote to this office, Aug. 25, 1893, as follows:—

"In answer to your letter of inquiry, * * * . There was a fire, cause unknown. I enclose a correct newspaper report of the matter. The children were very badly burned *all* over the head and face, portions of limbs and body, probably half of the surface, besides the head and face.

The newspaper report referred to by Dr. Lawbaugh, was as as follows:—

"The fire which destroyed the Manli house on the county road near here and fatally burned two children Sunday night caused great excitement among the neighbors. The wells being dry and no cistern near at hand the fire was extinguished by cutting away the roof. The women worked hard while many young and able-bodied men stood and looked on with their hands in their pockets.

"The reporter visited the scene of the fire yesterday morning and from the lips of Michael Manli, obtained his history as follows:— 'As is customary with me when I am home evenings, I put my little boys to bed up stairs. Sunday evening I sat by the bedside until they had fallen asleep and then looking at the lamp and adjusting the flame low enough, as I thought, to be perfectly safe, I went down stairs to keep my wife company. I had been down stairs only a little while when I heard my children screaming in a terrible manner. I rushed up stairs and was met by flames and dense smoke. I tried to save my little ones but could not reach them. Finally my father-in-law, Henry Ekman, managed to reach them and got them down and out of the burning building—but they were burned so badly that they died soon after midnight. Henry the elder was three years old and John was two years old. My wife is now in a very critical condition.'"

### *A man Slightly Burned by Kerosene in Otisco Township.*

Feb. 8, 1895, Louis N. Tuttle, M. D, health officer of Otisco township, Ionia county, reported to this office, the explosion of a lantern, carried by a Mr. Loveland, whose face and hand were slightly burned in the explosion.

### *A Woman in Lansing City Seriously Burned by Kerosene.*

The following appeared in the "State Republican" of Mar. 6, 1893:—

"Another explosion from a kerosene lamp occurred last Saturday night about 10 o'clock, by which Mrs. Amanda A. Waltz was severely burned and her home barely escaped being demolished by fire.

"Mrs. Waltz, who resides at 714 Turner street, had just lighted the lamp and was bearing it from the table to the mantle when it exploded, and her right hand was severely burned by the oil. The slight blaze as a result of the explosion was extinguished and medical assistance summoned."

In reply to inquiry from this office, A. S. Hyatt, M. D., health officer of the city, wrote as follows Mar. 7, 1893:—

"Injury to person is great and serious. Both arms, face, over chest, badly burnt and many large blisters on lower extremities. I saw the patient March 6, but did not get any of the kerosene they were using at time of explosion."

### *Four Persons Severely Burned by Kerosene in Lansing City.*

The "State Republican," Lansing, of June 1, 1893, contained the following item:—

"Michael Salewsky, his wife and two little children were terribly burned this morning about 1:30 o'clock, while attempting to escape from their burning house.

"They live at 601 Beech street, in a little, one-story house of four rooms, which includes a kitchen, parlor or living room, and two bed rooms adjoining. Last night they retired as usual, all sleeping in the same room, Mr. Salewsky, his wife and little boy in the same bed, and their 11-months-old infant in a cradle near.

"The lamp standing on the center table in the living room was left burning.

"About 1:30 o'clock Mr. Salewsky was awakened by the explosion of the lamp and leaping to the window attempted to open it. Failing, he grasped his little boy and throwing open the door rushed into the sitting room, which was a mass of flames, and tried to reach the door opening into the kitchen. This too was locked, and he plunged on to a window which he broke open, and passed out his boy. He then rushed back through the flames to his wife, who had arisen from the bed and rushed to her babe in the cradle, where she had been overcome by the heat and smoke and fainted with her child in her arms.

"Although already terribly burned, Mr. Salewsky picked up his precious burdens and once more made his way through the fire to the window, fairly dragging his wife after him. They finally reached the open air all terribly burned.

"By this time neighbors had assembled and while some were extinguishing the fire, others tended to the injuries of the brave man and his dear ones.

"Dr. Purvis was summoned and dressed the burns. He found that Mr. Salewsky had been perhaps fatally burned about the head and face, while his right arm from his shoulder down to his elbow was a raw mass. Besides these burns both hands suffered.

"Mrs. Salewsky is in a far more critical condition, her face being fairly charred by the flames and being bloated beyond all recognition. Her hands and arms are also frightfully burned.

"The children escaped with comparatively only slight injuries. The boy is slightly burned on the face and neck, and his hands are badly scorched. The babe is only slightly burned.

"All are in the most dreadful agony, and Dr. Purvis expressed grave doubts as to the recovery of his patients.

"The house is but slightly damaged, although all the furniture in the little sitting room was destroyed.

"Mr. Salewsky is a man about 28 years of age and has worked for some time in the wheelbarrow works."

Relative to this casualty, the usual letter of inquiry was sent from this Office, June 7, 1893, to the health officer of the city, who failed to reply to said letter.

### *Lady in Albion Severely Burned while Kindling a fire with Kerosene.*

The "Detroit Free Press" of Oct. 23, 1893, contained the statement that a lady in Albion had been severely burned while kindling a fire with kerosene. Oct. 25, 1893, a letter of inquiry relative to this casualty was sent to I. C. Foster, M. D., health officer of the city, who responded, Oct. 30, as follows:—

"Your letter at hand concerning the explosion and burning of Mrs. Smades, and I will state that I was away last week at the time it occurred; but I send you a clipping from an Albion paper which embodies all the facts, and which I have corroborated upon investigation."

Following is a copy of the clipping referred to in Dr. Foster's letter:—

"A painful accident last Monday morning befell Mrs. Jacob Smades, who with her husband resides at the home of Mrs. Elizabeth Comstock, on Pearl street, occupying the north half of the house. At about half past nine Monday morning she essayed to kindle a fire in her parlor stove. She supposed the fire to be entirely out, that nothing but dead coals remained in the stove. Acting on this theory, she took her oil can, containing less than a pint of kerosene, and began pouring oil into the stove. Instantly there was an explosion. The burning oil flew into Mrs. Smades' face and over her clothing. Mrs. Comstock, residing in the other part of the house, was startled a moment later by hearing Mrs. Smades scream, and seeing her rushing wildly through her apartments, enveloped in flame. Mrs. Comstock got the burning woman into the back yard and had her roll on the grass. Neighbors soon came and the flames were extinguished. Mrs. Smades was then taken to her room and Dr. Thomason was summoned. He found her terribly burned. Her face swelled to double its natural size and her arms were in fearful condition. For days her recovery was in serious doubt, but she has steadily shown improvement and there seems to be no further occasion for apprehension that the outcome will not be favorable, although she will be badly scarred. At the first news of the explosion someone gave an alarm of fire and the department turned out in force, but they were not needed. The fire in Mrs. Smades' parlor made a hole in the carpet, burned up two curtains, took the bottom out of a chair and destroyed a couch, but by that time it was put out."

### *Careless Use of Kerosene.*

Some of the casualties included in the foregoing lists and tables, were, evidently the result of carelessness, and might have occurred with the safest quality of oil. With ordinary care, two lives might have been saved, and much suffering and loss of property prevented, during the year 1893. Some dangerous practices, which have led to casualties, are mentioned below, in the hope that their avoidance may insure future safety:— (1) It is dangerous to leave small children alone in a room with a lighted lamp. (2) A burning lamp is most dangerous when the wick is turned down so as to emit only a small flame, because then the top of the lamp is very much heated. (3) A burning lamp without a chimney, or with a broken chimney, is dangerous, for the reason just stated. (4) It is *exceedingly* dangerous to attempt to kindle, or rekindle, a fire with kerosene.

## INJURIES AND LOSS OF LIFE AND PROPERTY ALLEGED TO HAVE BEEN CAUSED BY THE USE OF GASOLINE IN MICHIGAN IN 1893.

In 1893, as in former years, an effort was made, at the office of the Secretary of the State Board of Health, to collect facts respecting every casualty attributed to the use of gasoline, in Michigan, which came to notice. During the year there were received at the office of the Secretary of the Board reports of 54 casualties in 10 different parts of the State, alleged to have been caused by gasoline, with attendant losses of life and property, and personal injury, as follows:—Three persons fatally, and twelve persons more or less severely burned; damage to property to the amount of $12,778.

The amount of pecuniary loss was not reported in twelve of the above-mentioned 54 casualties.

TABLE 1.—*Casualties in Michigan during the year 1893, believed to have been consequent on the use of Gasoline, information of which was received at the Office of the Secretary of the State Board of Health.*

| | Number of Casualties. | Number of Localities. | Pecuniary losses, Dollars. | Lives lost. | Persons injured (not fatally). |
|---|---|---|---|---|---|
| In Detroit | 43 | 1 | 9,268 | 0 | 3 |
| In State (outside Detroit) | 11 | 9 | 3,510 | 3 | 9 |
| Totals in Michigan | 54 | 10 | 12,778 | 3 | 12 |

Of the 54 reported casualties from the use of gasoline during the year 1893, 16 were attributed to stove explosions, 18 to leaking or overflowing stoves, 3 to filling stove tanks while the stoves were lighted, 8 to carelessness in handling gasoline, and 9 to various other causes.

### *The Source of Danger in the use of Gasoline.*

The special source of danger in the use of gasoline, is its ready evaporization at low temperatures. When exposed to the air, gasoline evaporates quickly, mixes with the air, and therewith forms an explosive mixture which readily ignites when it comes in contact with a flame or other sufficient cause. This property of gasoline renders it more dangerous in handling than is gunpowder. Some of the casualties reported, were undoubtedly the result of ignorance, or disregard, of these facts.

Below are given details relative to reported casualties, some of which show the result of ignorant or careless handling of gasoline. The correctness of the details has been confirmed by health officers or other officials of the localities where the casualties occurred:—

## FATAL CASUALTIES CAUSED BY THE USE OF GASOLINE IN 1893.

Following are extracts from reports and correspondence relative to fatal casualties caused by the use of gasoline, which came to the notice of this Office:—

### *Woman Fatally Burned by Gasoline near the village of Sturgis.*

Dr. S. B. Follett, health officer of the village of Sturgis, reported to this Office as follows, relative to a casualty which resulted from the use of gasoline in said village:—

"On the 17th inst. Mrs. Sarah Roat (widow) was using the gasoline stove, and discovered that the tank needed filling. She turned out the fire, and commenced filling the tank. The gasoline took fire and frightened her so that she spilled some on her clothing which also took fire, and burned her so badly that she died about 12 hours afterward. The building was wholly destroyed. She was filling the tank from a pitcher as she usually did. Can't tell what ignited the gasoline. Miss Rachey Roat, a daughter, had her hands considerably burned trying to relieve her mother. There was no explosion. The foregoing statement embodies all the facts I can learn of the fire and its results.'

### *Woman Fatally Burned by Gasoline at Battle Creek.*

The "Detroit Evening News" of Aug. 22, 1893, contained the following news item:—

"Battle Creek, Mich.. Aug. 22, 1893. By the explosion of a gasoline stove, Mrs. Jas. Cooper was fearfully burned. She cannot recover."

In reply to inquiry from this Office relative to this casualty, L. M. Gillett, M. D., health officer of the city of Battle Creek, wrote Sept. 1, 1893, as follows:—

"Mrs. Cooper attempted to fill her gasoline reservoir while there was still a slight blaze in one of the burners. In some way the gasoline became ignited which transmitted the blaze to her clothing. Four-fifths of her skin was scorched by the burning clothing, and she died within 48 hours."

### *Woman Fatally Burned by Gasoline in Jonesville Village.*

The Detroit "Free Press" of Sept. 6, 1893, contained the following:—

"Jonesville, September 5.—(Special.)—The alarm of fire was sounded this afternoon for the east part of the village, at the home of A. B. Daniels, but the fire was put out before the department could get there. The cause was a gasoline stove which exploded while Mrs. Daniels was washing dishes and set her clothes on fire. When the flames were extinguished it was found that she was very badly burned. Dr. H. M. Warren was called and said that he thought it would be fatal."

Relative to this casualty, Edward C. Varnum, health officer of Jonesville, wrote to this Office, Sept. 7, 1893, as follows:—

"The Free Press item is correct. The lady, Mrs. Daniels, died this A. M. Positive information cannot be obtained, she being alone at the time. The supposition is there was a leak in the gasoline stove, or a burner was turned on and not lighted while another was burning. There was an explosion, but not in the stove, as that was not injured. This gives color to the leak or unlighted burner theory. Her story is very unconnected and contradictory, and gives no information, but in substance is: She heard a peculiar sound and turning saw everything ablaze. She grabbed the stove tank and started for the door. The flaming gasoline ignited, setting her clothing afire, she dropped the tank and ran outside, when neighbors came o her rescue. The house took fire but was easily extinguished. Her clothing was mostly burned off, burning the flesh and culminating in her death this morning."

## NON-FATAL PERSONAL INJURIES CAUSED BY GASOLINE.

### *A Man Burned by Gasoline in Saginaw City.*

The "Detroit Tribune" of February 22, 1893, contained the following item:—

> "SAGINAW, Mich., Special, Feb. 22.—George Gardiner, a plumber, while thawing out a pipe last night with a gasoline lamp met with a severe accident. The lamp exploded and his face and neck were frightfully burned. He was in such a position that he could not escape and help had to be summoned."

Relative to this casualty, S. E. Campbell, M. D., health officer of the city wrote to this Office, March 2, 1893, as follows:—

> "In reply to yours of the 27th ult. concerning an explosion, I have investigated. There was no explosion. Geo. Gardiner when under a house thawing out a pipe with a gasoline lamp turned it on too strong, a strong gust of wind caused it to flash up in his face burning him some. There was no fire resulted."

### *A Girl Severely Burned by Gasoline at Mount Clemens.*

The following item appeared in the "Detroit Journal" of March 3, 1893:—

> "Mt. Clemens, Mich., March 2.—Special.—A large gasoline stove exploded in the restaurant of Mrs. Mary Schwartz at 9:30 o'clock this morning, frightfully burning one of the maid servants and setting fire to the building. The contents were partially consumed. Loss, $500. Insured in the Security, of New Haven, Conn."

### *A Woman Painfully Burned by Gasoline at Adrian.*

The "Detroit Evening News" of March 7, 1893, contained the following:—

> "ADRIAN, Mich., March 6.—Mrs. Melinda C. Johnson was painfully burned this morning by a blazing gasoline stove. With her clothes afire, she rushed out of doors, and returning, turned off the blazing stove to save the house; then she ran out again and rolled in a snow bank. Neighbors tore her clothing off, barely saving her life."

### *A Woman and Her Son Burned by Gasoline at Port Huron.*

The following is quoted from the "Detroit Tribune" of May 5, 1893:—

> "PORT HURON, Mich., special Telegram, May 4.—Last evening a son of Mrs. William Hilton lighted a a cigarette in a room where the mother was cleaning some clothing with gasoline. The room was filled with fumes from the liquid and immediately an explosion occurred. The gasoline fell on Mrs. Hilton's dress and caught fire, burning her to such an extent that recovery is doubtful. The son was also badly burned about the face and arms."

Relative to this casualty the attending physician reported that the above-quoted newspaper report was substantially correct, and that "about one-fifth of Mrs. Hilton's body was burned. In a few days she will to able to leave her bed. The son's hands were slightly burned."

### *A Woman Severely Burned by Gasoline at Lansing.*

The following item is quoted from a Detroit newspaper:—

> "The physcians who are attending Mrs. Charles Spedin, of Shiawassee street east, who was burned by the explosion of gasoline while she was filling a stove last week, have finally decided that unless unforeseen complications arise, that it will not be necessary to amputate her left arm, as was feared, although the arm was frightfully burned."

A. S. Hyatt, M. D., health officer of the city of Lansing, replying to inquiries from this office, stated that the above-quoted newspaper report is substantially correct, and that "Mrs. Spedin says she does not know cause, but thinks there must have been fire in the pipes of the stove. She was filling gasoline stove tank at time of the accident. Left arm, side, back and front down to waist, burned."

### *A Girl Slightly Burned by Gasoline in Lansing.*

The "State Republican" of Sept. 8, 1893, contained the following item:—

"Miss Laura Madden, 927 St. Joseph Street west, was severely burned about the hands and face yesterday afternoon. She was standing beside a gasoline stove, and in some way her clothing became ignited. The little girl had the presence of mind to tear the burning garments from her body, and escaped with the above mentioned injury.

Dr. Hyatt, writing to this office relative to this casualty, states that the newspaper report is correct, except in the description of the injury, which consisted of slight burns on the hands and face.

### *A Woman Severely Burned by Gasoline in Grand Rapids.*

In the "Detroit Evening News" of Sept. 19, 1893, there appeared the following item:—

"Mrs. Nellie Ritzma, Grand Rapids, spilled gasoline, and then stepped on a parlor match. She will probably die.".

In reply to a letter of inquiry relative to this casualty, sent to the health officer of the city of Grand Rapids from this office, W. A. Wilson, Secretary of the board of health of the city, wrote making the following statements:—

"There was an explosion; but not of the stove. The woman, Nellie Ritzma, was moving, had moved the stove into another house. In picking up 'odds and ends' she found a quart bottle of gasoline which she placed on a box near a lighted lamp. The bottle exploded, and the gasoline was ignited at the same time, thus causing the fire. The woman will recover."

## CASUALTY CONSEQUENT ON THE USE OF NAPHTHA IN MICHIGAN, CALENDAR YEAR 1893.

During the year 1893, there was reported to the office of the Secretary of the State Board of Health, one casualty in the State, caused by the use of naphtha, with consequent damage to property amounting to $3,840.00.
The above mentioned casualty occurred in the city of Detroit, and from the Fire Marshal's report we quote the following statement relative to it:—

"Exploded." No other detail given.

# ALLEGED NUISANCES IN MICHIGAN IN 1893.

During the year 1893 communications relative to 46 alleged nuisances, were received at the office of the State Board of Health, from forty-five localities in Michigan.

The causes to which the alleged nuisances mentioned in these communications were attributed, may be classified as follows:

Hogs and poultry killed and dressed within two rods of residences, 1; burial of dead animals, 4; sawdust dumped on marshy land, 1; privies, cesspools, etc., 4; offal and other filth thrown in streets, 2; foul mill race, 1; hog yards, 3; abatement of nuisances in general, 1; drains, 4; water contaminated by sewage, 1; foul ditch, 1; stagnant water, 3; creamery, 1; manure piles, etc., 1; slaughter houses, 5; dams in rivers, 3; sewer pipes, 2; families living in a filthy state, 2; hog sprinkler, 1; sewerage, 1; mill ponds, 2, diseased and dead animals, 2.

Whenever complaint of an alleged nuisance is received at this Office, the health officer, or other official whose duty it is to have it abated, is informed of the nature of the nuisance, and is requested to investigate the same. At the same time sections of law and pamphlet publications of this Board pertaining to nuisances and to the duties of health officers and local boards of health relative thereto, are sent to the officials in the locality where the nuisance is said to exist, and also to the person making complaint. Copies of two forms, used on such occasions, are so freely used further on in this article that it is deemed not necessary to print them here.

The following extracts from the correspondence of this office relative to the above-mentioned alleged nuisances, show the nature of those nuisances, and the action taken, and recommended to be taken, in regard to them:

### HOGS AND POULTRY KILLED AND DRESSED WITHIN TWO RODS OF RESIDENCES.

January 10, 1893, A. B. Way, M. D., health officer of Duplain township, Clinton county, wrote to this office as follows:—

"There have been in two places in this village and within two rods of dwellings, hogs killed and dressed by butchers all fall and winter, and at each of the places named for two and a half months preceding January 1, 1893, at least one ton of poultry slaughtered and dressed every week. I applied to the Board asking for its suppression. The only response was for me to have them clean up and remove the offal as often as I thought necessary, which I have not done. I hold that it should be prohibited entirely. Am I right, and if so what is my remedy?

In reply to Dr. Way's letter the Secretary of this Board wrote to him Jan. 10, 1893:—

"Your question is fully answered on pages 2 and 9 of the pamphlet 'The Work of Health Officers and of Local Boards of Health in Michigan,' which is sent to you by this mail."

### BURIAL OF DEAD ANIMALS.

#### *Horse Buried Near a Well, an Alleged Nuisance.*

Jan. 4, 1893, Mr. William Dillon, health officer of North Star township, Gratiot county, wrote to this Office as follows:—

"I write to ask advice as to what is my duty in regard to a complaint entered, claiming it to be a nuisance. Private parties living two miles in the country, but in this township, complain that a horse is buried near their residence, 140 feet from a well that they use. I saw the other party and told him he would have to remove it; but today I learn that he has not done so, and complainant again entered another complaint, and I do not understand that I have anything to do with it. Please inform me my duty. I do not find anything in the statutes about its being the health officer's duty to look after it only to order it moved.

"Please answer at once as the complaining parties are terribly angry in regard to it."

In reply to Mr. Dillon's letter, the Secretary of this Board wrote to him and to the supervisor of the township, Jan. 10, as follows:—

"William Dillon, health officer of the township of North Star. * * *

"Dear Sir:—Replying to your letter of January 4, relative to an alleged nuisance in the township of North Star, (two miles from North Star) where a horse is buried 140 feet from a well which is used for drinking water.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this Office bearing on the same subject.

"I have asked the attention of the President of the Local Board of Health to this subject. If this office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result."

"A. W. Barnes, Supervisor of the township of North Star. * * * *

"Dear Sir:—Complaint reaches this Office of an alleged nuisance in the township of North Star, (two miles in the country from North Star) where a horse is buried 140 feet from a well used for drinking purposes.

"Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate* and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"Herewith I send you our pamphlet, 'Work of Health Officers and Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other pamphlet publications of this office bearing on the same subject.

"I shall be glad to be informed, whether or not, on examination, this alleged nuisance proves to be a nuisance, and if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed.

"I trust your board will abate this nuisance as promptly as possible."

### *Can Health Officers Enforce Burial of Dead Animals.*

H. A. Shurtleff, M. D., health officer of Lee township, Calhoun county, wrote to this Office, April 25, 1893, as follows, relative to the burial of dead animals:—

"I am health officer of the township of Lee, and wish to know how to proceed to make people bury dead animals. The idea prevails here that a health officer has no power to compel any one to do such work."

In reply to Dr. Shurtleff's letter the Secretary wrote to him April 28, 1893, as follows:—

"DEAR DOCTOR:—Replying to your letter of April 25, asking how the health officer is to proceed to make people bury dead animals, 'the law does not directly confer upon the health officer (nor upon any single officer of a township, city or village) power to abate any nuisance.' His action relative to a nuisance can only be advisory, and such as he is empowered, by vote of his board, to take as an executive officer of the local board.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the local board of health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of a nuisance, as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this office bearing on the same subject.

"If you desire I will ask the attention of the president of the local board of health to this subject. If this Office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time, I shall be glad to learn what is done to abate this alleged nuisance and with what result."

### *Insufficiently Buried Horse in Saranac Village.*

July 3, 1893, Charles Wunch, M. D., health officer of the village of Saranac, Ionia county, wrote to this Office, relative to the burial of a dead horse as follows:—

"Please inform me what is to be done about the following: A horse died last fall, was buried here (in Saranac). The man who owned it buried it on another man's land with his consent. It was near the river (Grand). The high water washed the dirt, or in other words uncovered it. Since then a man pretended to have reburied it; but not so but the dogs dug into it and it emits a horrible smell. What constitutes burying a horse? The horse virtually lies on top of the ground where it is covered with about 6 or 8 inches of ground, and then a lot of rubbish thrown over it to keep the dogs from entirely disinterring it. Who is the man who is responsible, the land owner, the man who owned the horse, or the man who pretended to bury the horse and took the pay for it? In the first place the horse was not properly buried or the high water would not have washed the dirt off. The board met last Friday, June 30th."

In reply to Dr. Wunch, the Secretary wrote July 6, 1893, asking his attention to sections of Howell's Statutes and paragraphs in pamphlet publications of this Board which contain information bearing on the subject of nuisances and their abatement.

### *Alleged Nuisance in Allen Township.*

July 12, 1893, F. G. Legge, M. D., health officer of Allen township, Hillsdale county, wrote to this office complaining that an insufficiently buried horse in his jurisdiction, was a source of nuisance, and asking information relative to its proper burial.

July 14, 1893, the Secretary of this Board wrote to Dr. Legge enclosing copies of sections 1640 and 7965, Howell's Statutes, and a pamphlet publication of this Board—"Work of Health Officers and of Local Boards of Health in Michigan," which bear on the subject of nuisances and the legal procedure necessary to their abatement.

In reply to the Secretary's letter Dr. Legge wrote, July 14, as follows:—

"Your letter received. In reply will say that we had no difficulty in securing proper burial of dead horse. The question raised was, to whom was the complaint to be made; and who was lawfully empowered to look after it."

### SAWDUST PILED ON MARSHY LAND AN ALLEGED NUISANCE.

The following letter dated March 15, 1893, was received at this Office from C. N. Coulter, a resident of Central Lake township, Antrim county:—

"In our town two saw mills have recently been built. At one of them the sawdust is being thrown into the lake; at the other they burn a large portion of it, and the remainder is being piled out over a large piece of swampy ground in order to cover it for a banking ground. The town board of health has forbidden the putting of any sawdust in the lake and ordered that all 'refuse' must be burned. Yet the owners of the last-mentioned mill claim that that which they desire to make use of is not 'refuse' and that that which they propose to do will not induce an unhealthy condition. What can be done in that matter? Please advise us. In the first case I think it will be stopped. I have been told that the owners of the last-mentioned mill claim that with consultation with the State Board of Health they were told that piling out sawdust over a swamp would not cause unhealthy conditions. How is that? Any advice will be thankfully received. We are anxious to preserve the best possible sanitary conditions in our town."

In reply to Mr. Coulter's letter the Secretary of this Board wrote, Mar. 18, 1893:—

"It would be impossible for me to give any correct opinion in regard to this case without examination of the situation. If there is enough sawdust to cover the ground, I should not think it necessarily injurious to public health; but, as I have said, it would be impossible for me to express any decided opinion at this distance from the locality, without examination."

On receipt of the above quoted letter from the Secretary, Mr. Coulter again wrote to this Office, Mar. 23, 1893, as follows:—

"Your favor of the 18th inst. in reply to mine relative to sanitary conditions in our town has been received. Thanks for your kind attention to the matter. From yours I conclude that I failed to make myself understood in the matter. The piece of ground consists of a gentle slope towards the shore of the lake and permeated with seeping springs which make it marshy and wet. I understand it is proposed to cover a portion of it to the depth of from 4 to 6 feet in order to use it for driving over and for banking logs. That body of sawdust covering several acres and decaying at the bottom, as it would, could not fail to send forth malarious influences. I think from the above you cannot fail to understand its condition. It amounts simply to a great pile of sawdust thrown out to decay on the ground. It is not proposed to incoporate it with the soil and form 'made ground.' Hoping that you will be able to give us some help in preserving the sanitary conditions of our growing village by your advice and influence, I am, most respectfully yours."

Relative to this nuisance, the following two letters were sent from this office on March 25, 1893:—

"*H. H. Chamberlain, Supervisor of Central Lake Tp.* * * * *

"Complaint reaches this office of an alleged nuisance in the township of Central Lake. Two mills have recently been built there, and the sawdust from one of the mills is being thrown into the lake; the sawdust from the other mill is being partly burned and the other part is being thrown on a wet, marshy piece of ground bordering the lake, so that this ground is partly covered. It is alleged that this is injurious to public health.

"Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate* and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"Herewith I send you our pamphlet, 'Work of Health Officers and Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other pamphlet publications of this office bearing on the same subject.

"I shall be glad to be informed whether or not, on examination, this alleged nuisance proves to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed."

"*C. N. Coulter, Central Lake, Michigan.*

"DEAR SIR:—Replying to your letter of March 23, relative to the alleged nuisance in the township of Central Lake, where the sawdust from two mills is being thrown into the lake and on a piece of ground which slopes toward the shore of the lake and which is marshy and wet, and injurious to the public health.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate* and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the local board of health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this office bearing on the same subject.

"I have asked the attention of the President of the Local Board of Health to this subject. If this office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result."

In reply to the last preceding letter, Mr. Coulter wrote to this Office, March 28, 1893, as follows:—

"Yours of the 25th inst. at hand. Your letter with accompanying documents, make the case clear. It is in the opinion of the board to decide the character of case in point. Whatever they may deem injurious to public health they may proceed to abate as a nuisance. That seems plain. After a new board comes into power we may see what they think. Thanks for your careful attention to the matter."

## PRIVIES, CESSPOOLS, ETC., ALLEGED NUISANCES.

### *Hotel Privy an Alleged Nuisance in Evart Township.*

Luther Russell, clerk of Evart township, Osceola county, wrote to this Office, Mar. 21, 1893, relative to an alleged nuisance in the village of Evart, as follows:—

"Within twenty-five feet of where this is written, is a saloon, adjoining the National Hotel. At the rear end of it is a privy. It is about eight or ten feet above the ground level, and the filth therefrom falls to the ground into a box arrangement. In warm weather the stench therefrom is offensive to those who pass by on the side-walk, on Main street. It is said that the whole under part of the saloon is so filthy that it is dangerous to the public health; but no one seems to make any effort to abate the nuisance."

In reply to Mr. Russell's letter the Secretary wrote to him, Mar. 22, 1893, sending him copies of sections 1640 and 7965, Howell's Statutes and pamphlet publications of this Board, which contain all necessary information relative to the proper legal method of procedure in the abatement of nuisances.

At the same time a letter was sent to the president of the board of health of the village of Evart, advising him of the complaint made, enclosing documents similar to those sent to Mr. Russell, and asking his attention to the laws relative to the abatement of nuisances.

### *Foul Odors from a Privy in Hillsdale City an Alleged Nuisance.*

Sept. 4, 1893, Mr. W. M. Hull, a resident of Hillsdale city, wrote to this Office, stating that a privy on the premises adjoining his, and situated near his dwelling, was a nuisance by reason of foul odors emanating therefrom, and asking the aid of the State Board of Health in obtaining abatement of said nuisance.

Acting on the information conveyed by Mr. Hull's letter the Secretary of this Board, Sept. 6, 1893, wrote to the Mayor of Hillsdale and to Mr. Hull, as follows:—

"*Hon. L. A. Goodrich, Mayor of the City, President of the Board of Health, Hillsdale, Mich.*

"DEAR SIR:—In the form of three affidavits, information reaches this Office of an alleged nuisance in the city of Hillsdale, consisting of a privy vault on the premises of Dr. Irvin, and that said vault is only about forty-four inches from a barn on Howell street, owned and occupied as a dwelling house by William M. Hull. That on the 17th. day of August last the said vault was cleaned and the contents, instead of being carried away, was buried on the lot of Dr. Irvin and less than seventeen feet from the said barn now occupied as dwelling house, and not being sufficiently covered, still continues to emit a very bad odor and at times causing people to become sick and vomit. Permit me to call your attention to the printed matter below.

"Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"Herewith I send you our pamphlet, 'Work of Health Officers and Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs, bearing on the subject of nuisances, and some other pamphlet publications of this office bearing on the same subject.

"I shall be glad to be informed whether or not, on examination, this alleged nuisance proves to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed."

"*William M. Hull, Hillsdale, Mich.*

"DEAR SIR:—Your letter relating to an alleged nuisance on the premises of Dr. Irvin, in the city of Hillsdale is before me. Permit me to call your attention to the following:

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this office bearing on the same subject.

"I have asked the attention of the President of the Local Board of Health to this subject. If this office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result."

In response to the Secretary's letter to the Mayor of Hillsdale, above quoted, the following letter, dated Sept. 13, 1893, was received at this Office:—

"Your communication of the 6th. inst. to Mayor Goodrich was, by vote of Council referred to me for reply.

"The complaint of Mr. Wm. M. Hull for the alleged nuisance mentioned has been before the Board at various times, and referred to our health officer, who has inspected the premises whenever requested, and each time reported them not to be in an unsanitary condition.

"The privy mentioned is on the rear of Dr. Irvin's residence-lot and adjoining the barn now occupied by Mr. Hull for a residence. That it is a private nuisance, there is no question, but as to its public nature the health officer reports, it is not injurious to health.

"There has undoubtedly a feeling grown out of the location of this privy between the parties, and Mr. Hull, I am informed, has been advised that so long as the premises are kept in a sanitary condition, the Board of Health is powerless, and that his course is to bring a personal action against said Irvin, enjoining him from using the same, but for some reason he has seen fit to harass the Board of Health recently with the matter at nearly every sitting of the council.

I am respectfully yours,

GEO. A. JANES, *Clerk*."

### *Urinal Basin in Perrinton Village an Alleged Nuisance.*

Sept. 9, 1893, G. Burton Wade, M. D., health officer of the village of Perrinton, Gratiot county, wrote to this Office as follows:—

"There is a water closet, or rather a urinal basin, which is a great nuisance. I have done all I can in the way of talking and trying to get the village authorities to abate it; but they have not the back bone to do it. Will you please advise me what to do? Should fever break out here I would be blamed for not doing my duty, and I do not proposed to be blamed for any such thing. I want to do my duty. * * * Please advise and help me."

In reply to Dr. Wade's letter the Secretary of this Board wrote to him Sept. 19, 1893, enclosing copies of sections 1640 and 7965, Howell's Statutes, and pamphlet publications of this Board which contain all the information asked for relative to the abatement of nuisances and to the duties of health officers and of local boards of health in regard thereto. At the same time a letter was sent from this Office to the president of the village of Perrinton, informing him of the complaint made by Dr. Wade and asking his attention to the alleged nuisance complained of. Copies of sections 1640 and 7965 Howell's Statutes, and pamphlets similar to those sent to Dr. Wade were also sent to the president of the village.

### *Cesspools at Owosso an Alleged Nuisance.*

Oct. 26, 1893, A. L. Arnold, M. D., President of the Board of Health of the city of Owosso. Shiawassee county, wrote to the Secretary of this Board as follows:—

"The board of health here are having some trouble over some improperly constructed cesspools, and a question of both legal and sanitary importance is staring us in the face. I interviewed our mayor (E. Gould) today, and we concluded it would be good policy to ask you to come down and look the ground over with us. We think that possibly your presence here would induce the parties concerned to abate the nuisance without having a legal fight, which is always to be dreaded in such cases. You will not require to lose much time as the trains make good connections.

"Kindly let me know if you can come and when? Hoping to get a favorable reply, I am yours fraternally."

Replying to Dr. Arnold's letter, the Secretary wrote, Oct. 26, 1893, as follows:—

"Replying to your request of Oct. 26, for me to come to Owosso, and 'look over' an alleged nuisance with your Board. * * * * I think it would not be practicable for me to come to Owosso this week, as the State Board of Health meets here tomorrow evening. Before I go to Owosso, I shall wish to have before me a statement of what this alleged nuisance consists, because I may wish to consult some law or decision.

"I might come next week for all that I know now; but I could not pay my own expenses."

Oct. 31, 1893, Dr. Arnold again wrote to the Secretary as follows:—

"Your reply to my recent letter, requesting a detailed description of the nuisance complained of, to hand, and would say that about one-half dozen of our prominent citizens have constructed cesspools by digging down some twelve or fifteen feet, and say ten feet in circumference, and bricking up the sides and leaving the bottom open so as to communicate with the strata of gravel from which the neighboring families get their supply of water. To these cesspools they have connected their privy vaults and water from bath tubs and etc. We have a system of water works but no sewerage.

"Now if convenient for you we would like you to come to Owosso on Friday next, and your expenses will of course be paid. In case the date does not suit you, please fix one and notify me when convenient."

In response to the last quoted letter, the Secretary wrote:—

"In accordance with your request of Oct. 31, I will endeavor to be at Owosso Friday. I understand that the train leaves here at about 11 o'clock, A. M., and I shall want to return that night."

In pursuance of the intention expressed in the last preceding letter, the Secretary visited Owosso, and, later made the following report relative to the sanitary conditions of that city:—

### *Report on Sanitary Questions in Owosso.*

"*Lansing, November 7, 1893.*

"*A. L. Arnold, M. D., President Board of Health, Owosso:*

"DEAR SIR:—By request, I respectfully submit a report of my conclusions relative to questions submitted to me for my advice.

"The disposal, of waste water from bath tubs, wash water, etc., by conducting it into receptacles below the surface of the ground where it is allowed to soak away, is not a proper or safe disposition of it. Aside from the danger of fouling with organic matter the ground water which is the water-supply of a large proportion of the citizens of Owosso, such washings are liable at any time by the rinsing of vessels, the washings of soiled clothing, etc., to contain germs of such a dangerous disease as typhoid fever, and thus to endanger some of those who drink water from wells. The bottom of at least one (and I think two) of these cesspools which I saw in Owosso was in the same water-bearing stratum of gravel from which users of neighboring wells drew their supply for drinking purposes.

"Since the first of August there have been reported in Owosso fifteen cases of typhoid fever and one death. This is a disease generally due to contaminated drinking water, and it should be entirely prevented. Besides the unnecessary death, there are here, through this preventable disease, great money losses to many households by reason of the loss of time of the sick person, and of at least one attendant for each sick person, the doctor's bills, medicines, etc. You may not be able to trace the source of these cases; but from what is known of the disease it is safe to assume that the most of them were caused by contaminated drinking water; and, unless something is done to prevent, this disease will continue to occur here each autumn. What that 'something' is which should be done in Owosso, I will more specifically advise further on in this report. It is first important to learn the probable causes.

"While it is true that cesspools (which carry into the sources of drinking water, waste water liable at any time to be infected) should not be permitted to be constructed, it should not be forgotten that every privy vault which is not water tight may involve a danger even greater than such a cesspool because, although the contents of the privy vault may filter through a little more sand or gravel before it reaches the water supply, its bottom is below the surface action of light, air, oxygen, and microscopic and other plant life which on or near the surface of the ground might do much to oxidize the harmful germs of disease. It must be admitted that those cesspools into which not only the waste water but the excreta from water closets is poured, are especially liable to facilitate the infection of the ground-water supplies for drinking purposes; because the current of water is then much greater than through the ordinary privy vault. Still, I think the greatest dangers to the greatest number of citizens are the privy vaults, which are nearest to those people who live in those parts of the city where the city water does not go, and where cesspools are therefore not so common.

"Wherever the city water goes it is necessary to dispose of the water after it has been used. It will hardly do to put it on the surface because there is more than can be thus well disposed of. Therefore as the cesspool method is dangerous, it seems imperative that the city should furnish sewers wherever it supplies water. That is the rule everywhere—the two systems must advance together. I advise that the board of health at once place before the council, the imperative necessity for beginning the construction of sewers, and for continuing the work until the main part of the city has a good general water supply, and sewers coextensive with the water pipes. This would dispose of the cesspool question; and of the dangers of the privy-system so far as the water pipes and sewers extend. But it must probably be a long time before these systems will be completed throughout the city, meantime there should be a systematic effort to protect the users of well water from the dangers of typhoid fever. Except for some unusually large establishments such as a hotel, school, etc., the greatest dangers to water drinkers are from the privies nearest the well from which the water is drawn. As a rule the very nearest privy is the one on the well owner's own lot. Throughout the city the privy vaults should be abolished. Wherever the water and sewer pipes reach, water closets should be used, connected with the sewer. Where the pipes do not reach, the dry-earth system of disposal should be adopted. If adopted there should be a sanitary inspector or scavenger constantly on duty, to regularly visit the closets, and to supply, if need be, the dry earth or coal ashes, and remove the contents of the closets to a safe distance without the city. It should be understood that the dry-earth system soon degenerates into a nuisance if not attended to, therefore its supervision is essential. If the city does not decide to abolish all privy vaults, it should certainly forbid the construction of any new ones. The same remarks apply to cesspools. And such orders should be enforced, an inspector being detailed for that purpose.

"It has been objected that such sanitary work as I have outlined is expensive. I grant that at first sight it seems so; but I believe it is not so expensive as trying to live without such sanitary improvements. It is expensive to have each year fifteen or twenty families suffering through a run of typhoid fever, as has been your experience this year. The loss of a few able-bodied citizens, even if they are valued at no higher rate than an ordinary slave sold for a few years ago, reaches up into the thousands of dollars. I believe that these sanitary improvements simply divert the payments of money into other channels, that, without those improvements, in a very few years nearly or quite an equal amount in value would be buried in the graveyard.

"I should think it best if a great part of the city should be at once supplied with water and sewers. If this cannot be done, I should certainly advise that as much as can be done should be done at once.

"Very respectfully,

"HENRY B. BAKER."

## OFFAL AND OTHER FILTH LEFT IN STREETS AN ALLEGED NUISANCE.

### *Alleged Nuisance in Marenisco Township.*

Mar. 22, 1893, L. P. Bourquin, a resident of the township of Marenisco, Gogebic county, wrote to this Office as follows:—

"The undersigned a citizen of the State of Michigan, a resident of Marenisco and Justice of the Peace of Gogebic county, respectfully represents that one Anton T. Lueckenbach has been holding the office, and drawing pay as Health Officer of the Township, for about two years, that in that time he has performed none of the duties incident to that office. That no sanitary measures were ever enforced, that filthy accumulations have been allowed to remain around barns, outhouses, and other places in this locality, that no causes or cases of sickness have been examined, or reported or acted upon, that in fact for the greater part of the past year said A. T. Lueckenbach has resided in Wisconsin where he has removed his family, his stock and his household goods. That not only has he neglected his duties but that in January last he killed an ox within 60 feet of the well where the greater number of the inhabitants obtain water, and from that time to this he has allowed the offal of said ox to lie exposed to sun, wind and weather, soaking into the ground and gradually finding its way to this well. I have attempted as a member of the Township board to have the board declare the office vacant and elect a new health officer but as I am acting alone I have not succeeded. If your Honorable body can suggest any other means of relief, I shall be glad to act upon it. In view of the probability of being visited by the cholera scourge the coming season it is necessary that action should be taken promptly. I can furnish witnesses or affidavits in support of my statements."

On receipt of Mr. Bourquin's letter, the Secretary of this Board, March 25, 1893, wrote to him and to the Supervisor of the township of Marenisco, as follows:—

"*L. P. Bourquin, Marenisco, Mich.*

"Dear Sir:—Your communication of March 22, making complaint against Anton T. Lueckenbach, health officer of Marenisco township, is before me, for which please accept thanks.

"I have written to A. V. Fuller, Supervisor of Marenisco township, giving him the substance of your complaint (not the name of the complainant), and suggesting that if the said Lueckenbach has removed from the township there is a vacancy; and if he has not removed and is the kind of a man represented in the complaint, he should certainly be removed.

"Section 1634 Howell's Statutes provides that 'every local board of health shall appoint and constantly have a health officer,' also 'Within thirty days after the annual township meeting in each year, the board of health shall meet for the transaction of business, and shall appoint or reappoint a health officer, and shall immediately cause to be transmitted to the Secretary of the State Board of Health, at Lansing, the full name and postoffice address of such health officer.' I should think that meeting would be the time to make the change in health officer, in case it is not done before that time."

"*A. V. Fuller, Supervisor of Marenisco township, Marenisco, Mich.*

"Dear Sir:—Complaint reaches this Office against Anton T. Lueckenbach, health officer of Marenisco township, stating that 'he has performed none of the duties incidental to that office. That no sanitary measures were ever enforced, that filthy accumulations have been allowed to remain around barns, outhouses and other places in the locality, that no causes or cases of sickness, have been examined or reported or acted upon, that in fact for the greater part of the past year, he has resided in Wisconsin, where he has removed his family, his stock and his household goods. That not only has he neglected his duties, but in January last, he killed an ox within sixty feet of the well where the greater number of the inhabitants obtain water, and from that time to this he has allowed the offal of said ox to lie there exposed to the sun, wind, and weather, soaking into the ground and gradually finding its way to this well.' It is the duty of the *local board of health* to abate this nuisance if it exists.

"If the health officer has removed from the township, there is a vacancy. If he is still residing in the township and is the kind of a man as represented above, he should certainly be removed and his place filled by a competent man."

The following letter dated March 28, 1893, received at this Office from Mr. Lueckenbach, explains the action taken by Mr. Fuller relative to this subject, and also the replies of Mr. Lueckenbach to the charges preferred against him by Mr. Bourquin.

"Your letter to A. V. Fuller chairman of our township Board of Health was handed to me and contents noted. In reply to this charge which I well know was made by one L. P. Bourquin, I must say that it is absolutely false, and I refer you to the officials of the township. This complaint is only spite, because I proceeded against him for leaving a horse he had left all winter to feed on manure piles, without shelter, which died in the spring from starvation, in or within, twenty rods of the residence portion of the town, in such a decaying state that it would have surely caused sickness. As to my having been out of the State, is for medical treatment of my wife, and have not intended, nor do I intend, to remove away."

### *Fish Offal Near Charlevoix an Alleged Nuisance.*

The following communication, dated March 14, 1893, was received at this Office from C. C. Price, a resident of the village of Charlevoix:—

> "I take the liberty of addressing you because I am unable to get our local Health officer to act. As I suppose you are aware, Charlevoix has quite a fishing industry, consequently there is a large quantity of fish offal which is taken just past the corporation limit and spread on top of the ground and left to decay, and the stench which comes from it is almost unbearable and greatly impairs the health of the whole community. As I stated above, it is impossible to get the Health Officer to act, only in this way, he tells the party to stop, which he promises to do, and there it ends until another complaint is made. Is there any way to stop this evil? If there is please inform me as to the course necessary to be taken."

March 15, 1893, the Secretary of this Board sent Mr. Price copies of sections 1640 and 7965 Howell's Statutes, and marked pamphlet publications of this Board which treat of the subject of nuisances and their abatement. At the same time the Secretary wrote to the President of the board of health of the village of Charlevoix asking his attention to the nuisance complained of; and sent him documents similar to those sent to Mr. Price.

## HOG YARDS AND PENS AS ALLEGED NUISANCES.

### *Proposed Hog Yard in Highland Township.*

April 1, 1893, Joel W. Powell, justice of the peace, and a resident of the unincorporated village of Clyde, Highland township, Oakland county, wrote to this Board as follows:—

> "The Creamery Company is fixing to have a hog yard right in our village. It will be within two or three rods of some dwellings and the passenger depot, and will scent the whole village, and if there is any way to stop it before they have completed it, the people would do it, and not have trouble all summer getting rid of it. Please send me instructions by return mail."

In accordance with Mr. Powell's request, the Secretary of this Board April 3, 1893, sent him copies of sections of Howell's Statutes and the pamphlet publication of this Board,—"The work of Health Officers and of Local Boards of Health in Michigan"—which said sections and pamphlet, treat of the subject of nuisances and the proper legal procedure necessary to their prevention and abatement; and consequently contained the information Mr. Powell desired.

On the same date, April 3, 1893, the Secretary wrote to C. B. Wilhelm, supervisor of Highland township, advising him of the purport of Mr. Powell's letter and asking his attention to the matter.

July 10, 1893, Mr. Fred Wheeler, another resident of Clyde, wrote as follows to this Office, relative to this alleged nuisance:—

> "I wish to call your attention to the Creamery Co.'s hog yard, located in Clyde, township of Highland, State of Michigan. This I consider a private, as well as a public nuisance, as it is only about 65 or 70 feet from my house and joins my property. This matter has been referred to you before, also I have notified the Town Board of Health. They have been here to investigate the matter; but have done nothing farther than to order said Company to keep the yard clean. The stench is becoming simply unbearable, and I consider my family in great danger of sickness, arising from such a nuisance. When the Board of Health was here, instead of coming and talking with those that were injured by the nuisance, they went and were probably bulldozed by the parties interested in the hogs. Aside from the hogs, there is a large tank of sour milk, which is run from the creamery down to troughs, to feed hogs. This, in connection with the smell from hogs is very offensive. Now Gentlemen I would be pleased to know what can be done in this matter. I am a hard working man, have saved enough to get me a little home here, and

would like to know if there are not laws that will give myself and family pure air. If this nuisance is not removed immediately, I shall be obliged to move my family. Would you please refer this matter to the Town Board, as your influence might be of some help."

July 12, 1893, the Secretary of this Board sent the following reply to Mr. Wheeler's letter:—

"Replying to your letter of July 10, in which you make complaint of an alleged nuisance in the un-incorporated village of Clyde, Highland Tp., where the hog pen belonging to the Creamery Co. is so offensive to the residents in that vicinity that it is dangerous to the public health, as is also the tank of sour milk which is used to feed the hogs, I would suggest that you consult the prosecuting attorney or some other attorney relative to this nuisance.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this office bearing on the same subject.

"I some time ago asked the attention of the President of the Local Board of Health to this subject. If this office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result."

### *Hog Yard in Clayton Village an Alleged Nuisance.*

July 20, 1893, L. G. Dodge, a resident of the village of Clayton, Lenawee county, wrote to the Secretary of this Board stating that there existed on the premises adjoining his in said village, a hog yard in which from 35 to 45 hogs were continually kept. That during the previous spring dead horses and cattle had been fed to the hogs, and that unconsumed portions of said animals were left unburied on the ground, emitting an unbearable stench. Mr. Dodge further complained of a butter-milk tank situated on the street, only 45 feet from his house, the ground around which tank, having become saturated with the milk, was very offensive. Mr. Dodge expressed belief that these conditions were injurious to the public health and a nuisance, for the abatement of which he had vainly appealed to the local health officials, and now solicited the advice and aid of the State Board of Health in accomplishing that object.

July 21, 1893, the Secretary of this Board wrote to the president of the village board of health of Clayton, advising him of the complaint made by Mr. Dodge, sending him pamphlet publications of this board and sections of the State laws which explain the duties of local boards of health relative to nuisances, and asking his attention to Mr. Dodge's complaint.

On the same date, July 21, the secretary wrote also to Mr. Dodge informing him of the action taken by this Office relative to his complaint.

### *Hog Yard in Hartford Township an Alleged Nuisance.*

Marcus Tuttle, a resident of Hartford township, Van Buren county, wrote to this Office, July 28, 1893, complaining of an alleged nuisance, consisting of a hog yard situated within ten rods of his dwelling, where 15 or 16 hogs were kept, and fed chiefly on slaughter house offal, unconsumed portions of which were left on the surface of the ground to decay and emit foul odors. Mr. Tuttle requested the interference of this Board to prevent the continuance of said nuisance.

On receipt of Mr. Tuttle's letter the Secretary wrote to A. P. Williams, Supervisor, and president of the board of health, of the township of Hartford, informing him of Mr. Tuttle's complaint, and asking his prompt attention to the alleged nuisance.

Aug. 4, 1893, Mr. Williams replied to the Secretary's letter as follows:—

> " Being informed by you of an alleged nuisance in the township of Hartford, I proceeded on the 2nd inst., to view the premises on which such nuisance was said to exist. I did not find the hog yard in as bad condition as was represented. I requested Mr. Sibson the owner of the hogs, to clean up the yard, which he did at once. I was there today and found the yard in good condition, with no cause for complaint. The yard in which the hogs are kept, is eighteen or twenty rods from Mr. Tuttle's house.

Aug. 23, 1893, Mr. Tuttle again wrote to the Secretary stating that the township board of health had declared the hog yard in question a nuisance and had caused its removal.

## DRAINS CONSIDERED AS NUISANCES.

### *A Blocked Drain in Casco Township an Alleged Nuisance.*

Isaac C. Burch, clerk of Casco township, St. Clair county, wrote to this Office April 26, 1893, as follows:—

> " We are having a little trouble over a drain. Two years ago, some parties residing in this township, made application to the county drain commissioner (there being no township drain commissioner at that time) to establish a drain, and the county drain commissioner proceeded to examine the proposed route of said drain, and granted the application, and a drain was accordingly constructed. The drain commenced at the southern boundary of a certain highway, and the man who owned the land where the drain commenced took the matter into court to test the legality of the proceedings establishing the drain, and he was successful in having the drain declared null and void. He then blocked up the drain on the line of the highway, which has the effect of flooding said highway and several farms in the vicinity to the great damage of the owners of said farms. Some of the parties have applied to me as clerk of the township board of health to cause him to remove the obstructions; but I am not certain whether the local board of health has jurisdiction in the matter or not. I applied to an attorney for advice and he told me I could do nothing, as the drain had been nullified. There is a way of getting rid of the water by digging about fifteen rods of ditch along the highway, but this would overflow a man's land who has land beyond. Now I wish you would let me know if the board of health has jurisdiction in the matter or not. As it is of course unhealthy to have the water standing on the land, I would like to know how to proceed lawfully in the matter. The lawyer of whom I asked advice on the matter said that nothing could be done until a new drain was lawfully established. By answering this you will greatly oblige."

In reply to Mr. Burch's letter, he was written to from this Office, April 27, 1893, calling his attention to sections of law which bear on the subject under discussion, and at the same time copies of said sections of laws and pamphlet publications of this Board bearing on this subject were sent to Mr. Burch.

On the same date, April 27, 1893, the following letter to J. L. Keller, supervisor of Casco township, was sent from this Office:—

"Complaint reaches this Office of an alleged nuisance in the township of Casco, where a drain beginning at the southern boundary of a certain highway is obstructed, causing the flooding of the highway and several farms in the vicinity, thereby doing great damage to said farms.

"Section 1640, Howell's Statutes, requires the local board of Health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"Herewith I send you our pamphlet, 'Work of Health Officers and Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other pamphlet publications of this Office bearing on the same subject.

"I shall be glad to be informed whether or not, on examination, this alleged nuisance proved to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed."

The following letter, dated May 6, 1893, was received at this Office relative to the above-mentioned alleged nuisance:—

"*Port Huron, May 6, 1893.*

"*Henry B. Baker, Secretary Mich. State Board of Health, Lansing, Mich.:*

"DEAR SIR:—Mr. J. M. Winkel, supervisor of Casco township, has been in to see me with reference to a communication received from your office by J. L. Keller, formerly supervisor of Casco township, inquiring about 'an alleged nuisance in the township of Casco where a drain beginning at the southern boundary of a certain highway has been obstructed, causing a flooding of the highway and several farms in the vicinity, thereby doing great damage to said farms.'

"From his statement of facts we glean that formerly an attempt was made to construct a drain from the highway southerly through the lands of one Schweiger. This was opposed by some of the parties interested and litigation is now pending about the same.

"Schweiger has filled up the drain where it leads into his premises thereby causing whatever water that gathers in the highway to stand there or find some other outlet. At the present time on account of the great quantity of rain that we have had there is a great deal of water along this highway, but Mr. Winkle does not regard it as a nuisance or as detrimental to the public health within the meaning of the Statute.

"It is clearly a controversy over the right to construct this drain and one which he thinks, and I join with him in thinking, should not be interfered with by the public authorities, and especially not under a pretense of benefit to the public health. If this water remains stagnant and a cess-pool is formed which would become injurious then possibly there might be some occasion for him to act but this state of facts does not now exist.

Yours truly,

"LINCOLN AVERY, *Pros. Atty.*"

Replying to Mr. Avery's letter, the Secretary wrote, May 12, 1893, as follows:—

"Please accept thanks for your letter of May 6, relative to an alleged nuisance in the township of Casco. * * * * * Another complaint has just been received relative to the same alleged nuisance."

The other complaint, referred to by the Secretry, was contained in a letter, dated May 10, 1893, from Alex. Gunn, M. D., health officer of Lenox township, Macomb county,—townshhip and county adjoining those in which this alleged nuisance is said to exist. Dr. Gunn stated that although the nuisance was not in his jurisdiction, he had been prevailed upon by people in the immediate vicinity, and whose lands and wells were overflowed by reason of the obstructed ditch in question, to write to this Office and ask what can be done to have the nuisance abated.

May 12, 1893, the Secretary wrote in reply to Dr. Gunn's letter as follows:—

"Your letter of May 10 relative to the alleged nuisance in the township of Casco, St. Clair county, is before me. Complaint has before been made relative to this same nuisance, and this morning a letter was received from Lincoln Avery, Prosecuting Attorney for the county of St. Clair, in which he states that he and Mr. Winkle (Supervisor of Casco Tp.) do not regard this as a nuisance detrimental to the public health within the meaning of the statute. If this is the view of the Supervisor and Prosecuting Attorney, I would think it would be a difficult matter to get the Board of Health to act.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate*, and *complete* remedy at law, and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same."

### *Defective Drainage of Mayville Village.*

Harry Soames, a resident of Mayville village, Tuscola county, wrote to the Secretary of this Board, May 8, 1893, complaining that the drainage of said village was very defective, that a tract of land five and three-fourths acres in extent and surrounded by houses, was from one to two feet under water which was turning green and fermenting. Mr. Soames expressed a wish that the Secretary would visit said village and do something to ameliorate its sanitary conditions.

In reply to Mr. Soames' letter the Secretary wrote, May 9, 1893, sending copies of sections 1640 and 7965 Howell's Statutes and pamphlet publications of this Board which contain information relative to the legal procedure necessary to the abatement of nuisances; and calling his attention thereto. At the same time the President of the local board of health was advised of the complaint made by Mr. Soames and his attention asked to the matter; and documents similar to those sent to Mr. Soames were sent to the President of the village and local board of health.

Further complaints were made to this Office Aug. 14 and 28, 1893, relative to this stagnant water and defective drainage in Mayville, by David Ferguson, another resident of the village. On receipt of said complaints, the attention of the President of the village was again called to this alleged nuisance, and to sections of law which make it the duty of local boards of health to enquire into all sources of conditions prejudicial to the public health and to prevent or remove the same.

In a third letter to this Board, dated Sept. 21, 1893, Mr. Ferguson stated that the unsanitary conditions in Mayville, previously complained of, still existed.

In reply to Mr. Ferguson's last letter, the Secretary wrote, May 16, 1893, as follows:—

"Your letter of September 21, is before me. Local nuisances are matters governed entirely by local boards of health, and this Office has done its duty when it has called the attention of the local board to the alleged nuisance. If the local board of health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

### *Slops from Hotel in Detour Township Drained into the Highway.*

June 19, 1893, L. E. Shepherd, M. D., a newly appointed health officer of Detour township, Chippewa county, wrote to the Secretary of this Board as follows:—

"I have a case on hand now where a hotel keeper has made a covered drain from his kitchen conveying slops, etc., to the public highway, the outlet being situated immediately at the gate of next door neighbor. We are not incorporated and can only come under the head of townships. The Hotel man says that he has taken legal advice and that he has only to convey slops from kitchen to highway and that the Township Board must provide an outlet from there. Is this the case? and if not what steps shall be taken to make the necessary reform as the discharge is producing a genuine nuisance? Your kind attention will oblige. Please post me in any way that you will understand a new man requires posting, and I will do the best I can."

In reply to Dr. Shepherd's letter the Secretary wrote, June 21, 1893, as follows:—

"In accordance with your request of June 19, I have sent you the Public Health Laws in force in Michigan in 1890, the last annual report of this Board, and some other publications bearing upon the restriction and prevention of the dangerous communicable diseases.

"Relative to the alleged nuisance in Detour, where a hotel keeper has constructed a covered drain from his kitchen to the street, to convey the slops, and the opening is at the gate of the next neighbor.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate* and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this offce bearing on the same subject.

"I have asked the attention of the President of the Local Board of Health to this subject. If this Office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance and with what result."

### *Undrained Swamp Hole in Thetford Township an Alleged Nuisance.*

September 11, 1893, A. H. Coddington, M. D., health officer of Thetford township, Genesee county, wrote to this Office as follows relative to an alleged nuisance in his jurisdiction:—

"Complaint has been made to me by the Township Drain Commissioner, and resident families, of a swamp hole in the north part of my Township, as a nuisance and of great danger to health, offensive, and unhealthy to the resident families and the community at large. Now I went and viewed the place and I find a swamp hole right along the public road, containing 14 or 15 acres of land which is subject to an overflow of water every spring, with no outlet. The water lays there and becomes stagnant and foul, filled with both animal and vegetable decayed matter, and about the middle of July or first part of August, becomes dry, as it is at present, and the air is filled with a stench dreadful to breathe, a perfect pest hole, a fit place to breed germs and poison. An epidemic of typhoid may break out at any time. It is the worst place it has been my privilege to see in years, and there are three families living within a hundred rods of it. One family having 3 or 4 children, live within ten rods of this terrible pit of infection. The water from their wells is poisonous, being filtered from this hole through the intervening earth, and at times their cellars are full of this dreadful polluting water, and I find the members of all three families at all times complaining. None of them are well. Two of these families are willing to do all they can to assist in having this place drained; but the third one, an ignorant Dutchman, opposes it and will fight it all he can as it will have to be drained across his land for 30 or 40 rods. I have had the Drain Commissioner and two surveyors over the proposed route and they find by opening a small drain of about 60 rods in length they can drain this sink hole perfectly dry at little expense; but this man will not give the right of way, and they have called on me as health officer of the town to help them remove this dangerous death-breeding hole. And now Sir I come to you for full instructions as to how I shall proceed in the matter. My local board is, as many others, negligent and indifferent. Well, I am anxious to coöperate with the State Board in doing all I can to prevent disease in my town, as well as cure them. I come to you asking you, at your earliest opportunity, to please give me full and plain instructions as to how I can and may proceed in this case, as I wish to at once proceed to open this pit before the fall rains come to fill it up again and thus to remove this death trap from this part of my town. This is an absolute necessity to public health, as can be proved by a number of persons, and a dangerous place which contagious diseases may arise from any day. I have consulted the law and I find no instructions in a case of this kind, and the Drain Commissioner cannot act alone, as he cannot get the right of way, and if he is left alone in the matter it will take almost a year before he can open the drain as there is much deley besides the cost, and the township will not go to the expense unless forced to by the health officer. Part of the cost will be paid by those applying to me if I can open it right away. Please assist me all you can and oblige."

In reply to Dr. Coddington's letter the Secretary wrote to him Sept. 13, 1893, as follows:—

"Your letter of September 11, relative to an alleged nuisance in the north part of Thetford township, consisting of a 'swamp hole,' is before me. Permit me to call your attention to the printed matter below.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the local board of health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this office bearing on the same subject.

"I have asked the attention of the president of the local board of health to this subject. If this Office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result."

At the same time the Secretary wrote also to Fred J. Wilber, supervisor and president of the board of health of Thetford township, as follows:—

"Complaint reaches this office of an alleged nuisance in the north part of Thetford township, consisting of a 'swamp hole' lying along the highway, and that it has no outlet. That about July or August it becomes dry, causing a terrible stench, and that there is a family with three or four children living within ten rods of it, and at times their cellar is filled with water from the swamp, and also their well is affected by it. That application has been made to the township drain commissioner to have it drained, but that a German living near it objects to it, as it will have to be drained across his land. Permit me to call your attention to the following:—

"Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and cases of sickness that may, in their opinion be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"Herewith I send you our pamphlet, 'Work of Health Officers and Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other pamphlet publications of this office bearing on the same subject.

"I shall be glad to be informed whether or not, on examination, this alleged nuisance proves to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed."

Replying to the last-quoted letter, Mr. Wilbur wrote Oct. 3, 1893:—

"In regard to a certain swamp located in the north part of Thetford, will say I think the letting of drain by our town drain commissioner for the purpose of draining said swamp has been completed. If not will notify you in the near future."

### *Hotel Drain Emptying into an Open Ditch an Alleged Nuisance.*

G. W. Nafe, health officer of the village of Fremont, Newaygo county, wrote to this Office May 18, 1893, relative to an alleged nuisance in his jurisdiction, as follows:—

"You will pardon me for this intrusion; but I want your advice and opinion relative to the powers and duties of a local health officer in a given case, which is as follows: The leading hotel of this place (De Hass House) situated in the central portion of the village, has constructed a tile drain emptying into an open ditch about six or eight rods from the hotel. The open ditch passes by two blacksmiths' and wagon shops, and several dwelling houses. All the refuse of the hotel and basement saloon, water-closets, swill, slops, etc., is dumped into the drain, and when it reaches the open ditch, it is anything but beautiful to behold, and the odor at times, especially during the hot, dry weather is anything but fragrant, I assure you. It is simply terrible, and I am sure may become dangerous to the public health, if not already so. There is no public sewerage in the village. What would you advise to be done? and who would be the proper person to do it? Can the village health officer order it abated, or must the village council take active and decisive measures in the matter? Can we begin action on the hotel keeper and saloon, compelling them to desist from further emptying their refuse matter in the drain? and how must we proceed?"

In reply to Dr. Nafe's letter, the Secretary of this Board wrote to him May 19, 1893, referring him to sections of law and paragraphs in pamphlet publications of this Board which contain the information desired, and sending him copies of said sections of law and pamphlets.

On the same date, May 19, 1893, the Secretary wrote also to the president of the village of Fremont advising him of the purport of Dr. Nafe's letter, sending him documents similar to those sent to Dr. Nafe, and asking his coöperation in the abatement of this alleged nuisance.

## WATER SUPPLY CONTAMINATED BY SEWAGE AT MACKINAW CITY.

Early in May 1893, complaint was received at this Office that the drinking water at the depot, hotel and on cars belonging to the Michigan Central Railroad, at Mackinaw City, was contaminated by sewage, and that said contamination was due to the too close proximity, in shallow water of the bay, of the outlet of the sewer and in-take of the water-supply pipes. The following letter written by the Secretary May 3, 1893, to H. B. Ledyard, president and general manager of M. C. R. R. Company, explains the action of the Secretary relative to this alleged nuisance:—

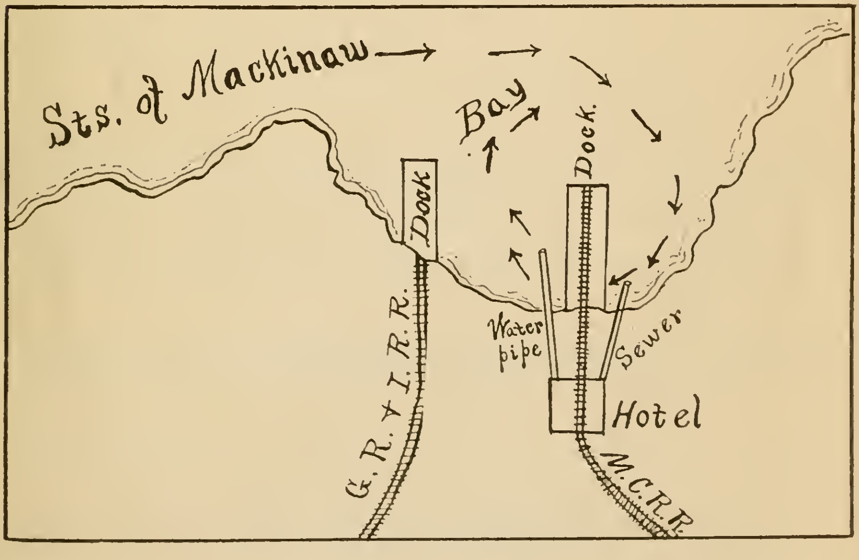
"DEAR SIR:—Permit me to ask your attention to the condition of affairs at and around the station hotel of the M. C. R. R. at the City of Mackinaw. It is alleged that the sewage from the depot goes into the bay only about 150 ft. from the end of the in-take pipe which supplies water to be used by the traveling public, employees and guests of the hotel, and that by the currents of the bay the sewage is cometimes carried to the in-take for the water-supply. It is also alleged that on account of this condition, cases of typhoid fever have already occurred. With such an arrangement typhoid fever will be likely to occur.

"I respectfully suggest that you cause the water pipe to be extended out past the G. R. & I. R. R. dock, so that the eddy sometimes formed in the bay would not carry the excrement or foul water from the sewer to the water pipe. The in-take pipe should not be at the end of the dock, because there it might sometimes take in excreta from the water closets of the boats lying at the docks.

"Herewith I send you a diagram which will put the subject more clearly before you."

Copy of the diagram mentioned in the Secretary's letter is given below.

Site of Alleged Nuisance in Mackinaw City village, Cheboygan County.



[PLATE 792]

NUISANCES ATTRIBUTED TO STAGNANT POOLS.

*Stagnant Pool in Orion Village an Alleged Nuisance.*

Daniel McKendrick, a resident of the village of Orion, Oakland county, wrote to this Office, June 19, 1893, as follows:—

"There is a body of stagnant water adjoining my place, and those of several others, in this village, which should be drained, as it is causing sickness. I have spoken to the board of health; but they have not acted on the matter. Please attend to it at once and oblige."

Acting on the information contained in Mr. McKendrick's letter, the Secretary of this Board, June 20, 1893, wrote to the President of the village of Orion advising him of Mr. McKendrick's complaint and asking his attention to the matter. At the same time copies of sections of laws and pamphlet publications of this Board, bearing on the subject of nuisances and their abatement, and the duties of local boards of health relative thereto, were also sent to the President and to Mr. McKendrick, the complainant.

In reply to the Secretary's letter, J. P. Coon, President of the village of Orion, wrote, June 22, 1893, as follows:—

"Your communication of 20th inst. in regard to pool of stagnant water in our village received. In answer say that it is one of those 'cat-holes' for which eastern Michigan is noted; not any better, nor particularly worse, than many of its kind to be found in this locality. The village has a public sewer running within 150 feet of it, which was last fall repaired. The village authorities then wanted to drain the place; but the owner of the lands necessary to cross with the drain refused to let us do it without paying damages, and it was not done. Now they want the village to drain it at the expense of the village. While the Council do not refuse to do it, we do not like the idea of draining private property at public expense.

"I do not apprehend any great danger to public health from it at present. Any advice, order, or suggestions as to the matter, you may choose to give, will be thankfully received and claim our due consideration."

June 29, 1893, C. E. Linabury, principal of schools of the village of Orion, wrote to the Secretary of this Board relative to this alleged nuisance, as follows:—

"Our council still do nothing to abate the nuisance caused by the stopping of an old sewer whereby about three acres of ground is covered with stagnant water on which there is now a covering of green slime, also for the last three weeks there has come from it a bad odor, also a large number of polywogs. It has already caused a case of scarlet fever. What order shall we pursue to get this removed?"

In response to Mr. Linabury's letter, June 30, 1893, the Secretary wrote as follows:—

"Replying to your letter of June 29, relative to the alleged nuisance in the village of Orion, where there is a pond of stagnant water which is thought to have caused sickness,—June 20, the attention of the president of the village was called to this alleged nuisance and he replied that he did not apprehend any great danger to the public health, also that the pond would have been drained last fall had the village been able to get a right of way for a drain without paying damages.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the *circuit court equity jurisdiction in all matters concerning nuisances where there is not a plain, adequate and complete remedy at law;* and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, *any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.*

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this office bearing on the same subject.

"You can ask the attention of the President of the Local Board of Health to this subject. If this office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result."

### *Stagnant Water in Watertown Township an Alleged Nuisance.*

Edward Putnam, a resident of Watertown township, Clinton county, wrote to this Board, Oct. 5, 1893, as follows:—

"I write to enter complaint against our town board of health. As you will see by the copy of the proceedings which you will find enclosed, they agreed to take the water away; but in place of that they have turned the water on us when stopping the outlet we already had. If it remains as it is we shall be under water around the house. We have entered complaint to the officer but he does not do anything about it. Hope you will attend to the matter at once."

The following is a copy of the "enclosed" document referred to by Mr. Putnam:—

"June 20, 1893. Board met at Edward Putnam's on Sec. 10 to view his premises to see what to do about taking the water away from his place. After discussing the matter, a motion was made that the Highway Commissioner let a job of ditching on the highway between Secs. 10 and 11 to take the water away, to not exceed 40 dollars, and to be taken from the Contingent Fund. Motion carried."

In reply to Mr. Putnam's letter the following letter, dated Oct. 9, 1893, was sent from this office:—

"Your letter of Oct. 5, enclosing a copy of the township board's action, in regard to taking the water away from the place of Edward Putnam is received. In reply I would say that the subject is something for the local board of health to settle."

### *Pond in Millington Village an Alleged Nuisance.*

Welton Van Wagnen, a resident of the village of Millington, Tuscola county, wrote to the Secretary of this Board June 12, 1893, as follows:—

"I appeal to your Board after all other honorable means have failed. As a resident and taxpayer of the village of Millington, I have a pond of water for which I am unable to procure an outlet, as the same must necessarily cross a street in order to be taken off. Although I and other residents adjacent to said pond have petitioned the council and health officer of the township and village to cause same to be removed, they fail to take any action on the same. With an outlay of a few dollars the same could be made all right. All we ask is an outlet and the owner of the pond will immediately drain the same. Please tell me what action to take when a petition to the council and health officer fails. The pond or low land has a butcher's shop near where all the slops from the same are dumped into, which cannot fail to cause sickness sooner or later. We have had two deaths from diphtheria here lately. Please advise me by return mail and oblige."

June 14, 1883, the following reply to Mr. Van Wagnen's letter was sent from this office·—

"Replying to your letter of June 12, asking how to proceed to drain a pond in the village of Millington into which refuse from a butcher-shop is dumped, and which cannot fail to be a source of sickness, I recommend that you consult the prosecuting attorney or some local attorney in your village."

### CREAMERY IN MAYVILLE AN ALLEGED NUISANCE.

The Secretary of this Board received the following telegram, June 26, 1893, from Dr. B. D. D'Arcy, health officer of the village of Mayville, Tuscola county:—

"There is bad nuisance from creamery in our village. Manager has been notified and nuisance is not removed or disinfected. How shall I proceed? What is my authority?"

The following telegraphic reply to Dr. D'Arcy's telegram, was sent from this Office:—

"Notify local board. Read page nine pamphlet Work of Health officers."

June 28, 1893, Dr. D'Arcy wrote to the Secretary of this Board as follows:—

"I telegraphed last Saturday evening asking for instructions how to proceed in a case of nuisance produced by creamery in this place, and you told me to notify local board, which I had done. And as regards the pamphlet mentioned in your telegram, I have received none from the health office. I want full instructions and then I will act upon them. My time is fully taken up with my practice; but send your instructions from the State Health Office and I will either act fully or resign. I do not believe in doing things half way."

In reply to Dr. D'Arcy's letter the Secretary wrote July 1, 1893:—

"Replying to your letter of June 25, relative to an alleged nuisance in the village of Mayville, produced by a creamery, pamphlet publications relative to the restriction and prevention of the dangerous communicable diseases, together with a copy of the pamphlet 'Work of Health Officers and of Local Boards of Health,' were sent you April 26; and, supposing you received the pamphlets, the telegram was sent referring you to page nine of the pamphlet on the work of health officers.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate* and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances and some other publications of this office bearing on the same subject.

"I can ask the attention of the President of the Local Board of Health to this subject if you wish. If this office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result.

### MANURE PILES AND OTHER FILTH AN ALLEGED NUISANCE.

June 23, 1893, M. W. Lang, M. D., wrote to the Secretary of this Board from Marysville, Port Huron township, St. Clair county, as follows:—

"The Board of Health of this town (Port Huron) and village (Marysville) were down a few days ago and viewed the different places, served notices, etc. Now some have cleaned up and some have not. They have never called to see whether or not their notices were complied with, and I deem it my duty as a Physician to acquaint you of the fact. The chairman has been notified of their not cleaning up and has taken no action, so I thought I would see if there were not a way of compelling the Board of Health to do their duty. Please let me hear from you."

In reply to Dr. Lang's letter, the Secretary wrote to him June 28, 1893, as follows:—

"Replying to your letter of June 23, relative to an alleged nuisance in the township of Port Huron, if you will have the kindness to state just what this alleged nuisance is, and where it is situated, I will call the attention of the President of the local board of health to the subject."

July 2, 1893, Dr. Lang replied to the Secretary's letter as follows:—

"Yours received a few days ago, and contents noted. In reply would state, viz.: one manure pile in close connection with house and settlings and dirt arising therefrom. Manure wagons left standing in street. No conveniences for the lumbermen and the stench from the lumber yards is terrible. The refuse of the kitchen and chip yard thrown into the water course on the highway. I do not understand why there is so much delay. Why did you not refer, or call the attention of the Board of Health to the matter at once, and not be losing valuable time? You might have notified the Board and had them come and see, instead of that you write me to find out just what the so called nuisances are, and then if they are not considered such by you, nothing will be done. I am not on the Board of Health, but I think I understand what constitutes a nuisance, and if these are not removed, I shall see if there is not some way of making the Boards of Health perform their duty."

On receipt of Dr. Lang's second letter, the Secretary wrote, July 6, to the President of the Board of Health of the township, calling his attention to this alleged nuisance; and at the same time copies of sections of laws, and pamphlet publications of this Board, bearing on the subject of nuisances, and the duties of local boards of health relative to their abatement, were sent to him and to Dr. Lang, July 6, 1893.

July 8, 1893, the following reply to the Secretary's letter was received from C. A. Bailey, Supervisor and President of the board of health of Port Huron township.

"Yours of July 6, received. In reply would say notices have been served on the interested parties to remove nuisances complained of, by the Board of Health of the township. If not removed we shall submit the matter to the Prosecuting Attorney of the county."

## SLAUGHTER HOUSES ALLEGED NUISANCES.

### *Slaughter House in Holton Township.*

July 8, 1893, Geo. D. Burton a resident of the unincorporated village of Holton, in the township of Holton, Muskegon county, wrote to this Office complaining of an obnoxious slaughter house, situated not nore than eighty rods from the center of the village.

July 10, 1893, the Secretary wrote to the President of the board of health of Holton township relative to this alleged nuisance, as follows:—

"Complaint reaches this Office of an alleged nuisance in the township of Holton, where a slaughter house within eighty rods of the center of the unincorporated village of Holton, is obnoxious, and alleged to be dangerous to the public health.

"Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain, adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"Herewith I send you our pamphlet, 'Work of Health Officers and Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other pamphlet publications of this office bearing on the same subject.

"I shall be glad to be informed whether or not, on examination, this alleged nuisance proves to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed.

In reply to the last quoted letter, the Supervisor of the township, Ole C. Olson, wrote to the Secretary, July 15, 1893, as follows:—

"In reply to yours of the 10th instant in regard to a nuisance, the 13th I went to said slaughter house myself. There is no more smell than as around your house. It is kept in good shape. The Health Officer of Holton township also has been there and will say the same thing. It has been reported through spite. Shall do nothing about it."

July 15, 1893, Mr. Burton again wrote to the Secretary relative to this alleged nuisance, as follows:—

"The Township Board of Health refuses to have any thing to do with the complaint I made to you. The stench is almost unendurable and his slaughter pens run clear to the creek. You can do as you please about the matter."

In reply to this last letter from Mr. Burton, the Secretary wrote July 17, 1893, as follows:—

"Replying to your letter of July 15, relative to the alleged nuisance in Holton, if the local board of health refuses or neglects to make proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same. I would suggest that you consult the prosecuting attorney, or some other attorney, relative to this nuisance."

### *Health Officer Asks for Information Relative to Slaughter Houses.*

A. T. Holcomb, M. D., health officer of Hazelton township, Shiawassee county, wrote to the Secretary of this Board, July 21, 1893, asking for information as to his duties relative to slaughter houses, as follows:—

"Where can I find the law touching on slaughter houses? Have I any right to interfere without calling township board together? Please inform me soon."

In reply to Dr. Holcomb's letter, pamphlet publications of this Board and copies of sections of laws, which contain the information asked for, were sent to Dr. Holcomb from this Office July 22, 1893.

### *Slaughter House Refuse in Fife Lake Village an Alleged Nuisance.*

June 6, 1893, Mrs. A. O. Blue, a resident of Fife Lake village, Grand Traverse county, wrote to this Office as follows:—

"In our little village of Fife Lake we have a slaughter house and the butcher has taken no care of the refuse for about a year. There is more than two tons of inwards, stomachs and heads lying there. We have notified the board of health here several times this spring, but they pay no attention to us. The slaughter house is within 50 rods of my house, and I can stand that dreadful smell no longer. Will you please assist us in having it taken care of? Diphtheria is in town now."

June 7, 1893, the president of Fife Lake village board of health was advised of the complaint made by Mrs. Blue, and his attention to the alleged nuisance was requested. At the same time pamphlet publications of this Board, and sections of laws bearing on the duties of local boards of health, relative to nuisances, etc., were sent to him, and also to Mrs. Blue, the complainant.

### *Slaughter House in Franklin Township an Alleged Nuisance.*

Aug. 12, 1893, Russell W. Brown, M. D., health officer of Franklin township, Clare county, wrote to this Office as follows:—

"There is a butcher in this place who insists in maintaining a slaughter house within the village, in fact, he does his slaughtering almost on Main street. Complaint after complaint has been made, and I have repeatedly notified him to desist, but he still continues to violate the *law*. What would you advise me to do?"

In reply to Dr. Brown's letter, the Secretary of this Board wrote to him Aug. 14, 1893, as follows:—

"Your letter of August 12, referring to a butcher who insists in maintaining a slaughter house in Meredith is before me. I call your attention to sections 1640 and 7965 of Howell's Statutes as quoted below:—

"Section 1640 Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the local board of health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this office bearing on the same subject.

"I have asked the attention of the president of the local board of health to this subject. If this office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result."

At the same time the following letter was sent to the president of the board of health of Franklin township:—

"Complaint reaches this Office that there is a butcher in the village of Meredith who insists in maintaining a slaughter house within the village, in fact he does his slaughtering almost on Main street. It is alleged that he has been repeatedly notified by the health officer to desist, and still he continues to violate the law.

"Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"Herewith I send you our pamphlet, 'Work of Health Officers and Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other pampnlet publications of this office bearing on the same subject.

"I shall be glad to be informed whether or not, on examination, this alleged nuisance proves to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed."

### *Slaughter House in Saline Village an Alleged Nuisance.*

Sept. 6, 1893, S. W. Chandler, M. D., health officer of Saline village, Washtenaw county, wrote as follows to the Secretary of this Board asking information relative to slaughter houses:—

"I wish to ask information about slaughter houses. What is the law in regard to their situation in the neighborhood of occupied residences? and what the procedure to cause their removal from such position? We have one here that is a great offence to a few people. When the wind is in the right direction, it fills the houses near enough with the odor of it, and often causes horses to shy, prick up their ears, and start along the road faster to get away from it. One of the occupants of these dwellings requested me to see what could be done about the matter. An early reply is requested."

In reply to Dr. Chandler's letter, he was written to from this Office Sept. 7, 1893, calling his attention to sections of laws which contain the information asked for in his letter. At the same time copies of sections 1640 and 7965, Howell's Statutes, and pamphlet publications of this Board, which bear on the subject of nuisances and their abatement, were sent to Dr. Chandler.

By letter from this Office, dated Sept. 7, 1893, the president of the board of health of Saline was advised of the complaint made by Dr. Chandler, and his attention was called to the duties of local boards of health relative to nuisances. At the same time documents similar to those sent to Dr. Chandler were sent to the president of the local board of health.

## DAMS IN RIVERS ALLEGED NUISANCES.

### *Dam Across Tittabawassee River in Edenville Township, Midland County.*

Aug. 7, 1893, Benjamin Lee, Supervisor of Edenville township, Midland county, wrote to the Secretary of this Board relative to an alleged nuisance in said township, consisting of a dam across the Tittabawassee river which was cause of overflow of land in the neighborhood and was consequently a menace to public health. Mr. Lee stated that the board of supervisors of Midland county had passed a resolution ordering that said dam be removed; and that his object in writing was to request action of the State Board of Health by which the removal might be hastened.

In reply to Mr. Lee's letter, the Secretary wrote to him Aug. 8, 1893, as follows:—

> "Replying to your letter of Aug. 7, relative to the alleged nuisance in the township of Edenville, where the dam across the Tittabawassee river causes an overflow of the surrounding country,—The next regular meeting of this State Board of Health is to occur on the second Friday in October, 1893, when the subject might be considered if not crowded out by other important business. There are not facts enough, however, in your communications to enable me to place the subject before this Board when it does meet, in a way to reach any conclusion. I should think that the removal should not be made in hot weather, but should be done in the Autumn. I do not understand that there is in this case a 'plain, adequate, and complete remedy at law,' consequently your board of health should ask the circuit court for an injunction, as specified below:—
>
> "Section 1640, Howell's Statutes, requires the local board of health to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.
>
> "Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.
>
> "Herewith I send you our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other pamphlet publications of this office bearing on the same subject.
>
> "I shall be glad to be informed whether or not, on examination, this alleged nuisance proves to be a nuisance, and, if it is, what measures are taken for its removal or abatement, and with what result. For this purpose a stamped envelope is herewith enclosed."

### *Dam in Platte River an Alleged Nuisance.*

During the year 1893 several letters were received at this Office from Chas. F. Sanscrainte, a resident of Almira township, Benzie County, relative to an alleged nuisance in that township, said to be caused by a dam in Platte river.

In August, 1888, and on several subsequent occasions, complaints have been made to this Office relative to this alleged nuisance, details of which are printed in Annual Reports of this Board.—Report for 1889, p. 290; for 1892, p. 305; and for 1893, p. 345.

The purport of Mr. Sanscrainte's letters, above mentioned, seems to be that he had instituted suit for the abatement of said nuisance, that judgment (with costs) had been given against him, that he believed said judgment unjust, and that he desired that this Board aid him in having it reversed.

In reply to Mr. Sanscrainte's last letter, the Secretary of this Board wrote, Aug. 10, 1893, as follows:—

"Replying to your letter of Aug. 8, relative to the alleged nuisance in Almira township,—The next meeting of the State Board of Health will be on the second Friday in October, when the subject might be placed before the Board should there be opportunity, and it is not crowded out by other important business. From the facts contained in your letter I have not enough before me to place the subject intelligently before the State Board, should there be opportunity. Should I place the subject before the Board I would have to have specific information showing me that the alleged nuisance is a nuisance and just how it is nuisance."

### *Mill Dam at Minard, Tompkin's Township, an Alleged Nuisance.*

August 19, 1893, Henry T. Whitmore, postmaster at Minard, Tompkins township, Jackson county, wrote to the Secretary of this Board as follows:—

"The mill dam at Minard, in the Township of Tompkins, county of Jackson, was broken. It has let all the water off, except a small channel. The pond covers about 75 acres, when at a common head. The owner, Mrs. George Stevens of 821 North Mechanic street, Jackson city, Mich., has made no move toward repairing the dam yet. It has caused a terrible smell here, so bad, that the people near here have had to keep their houses tightly closed at night. If it is not stopped at once it will undoubtedly cause a great deal of sicknes here. You will confer a great benefit to the people here if you will look into the matter immediately."

On receipt of Mr. Whitmore's letter, the Secretary of this Board wrote to the president of the board of health of Tompkins township, informing him of the complaint made, enclosing copies of sections 1640 and 7965, Howell's Statutes, and asking his attention thereto.

## SEWER PIPES AND SEWAGE ALLEGED NUISANCES.

### *Sewer in Owendale, Brookfield township, an Alleged Nuisance.*

Malcolm McDonald, health officer of Brookfield township, Huron county, wrote to the Secretary of this Board, Aug. 31, 1893, as follows:—

"I want some information about how to act with a case of nuisance. Within my jurisdiction, there is a boarding house where from 30 to 40 persons board. There is a pipe from the house running underground to the highway ditch, where all the slop of the house is emptied, and this dirt accumulates at the mouth of the pipe, because it has no outlet, and causes a lot of stench. The pipe runs about 5 rods from the house to the highway. I notified the keeper of the boarding house about it and he said he had nothing to do with the highway. Then I spoke to the Overseer of Highways. He told me to go to the boarding house keeper. Now, Sir, I would like if you could inform me which of those parties has a right to clean away the same nuisance. There is a family living in a house within 2 or 3 rods of this dirty pond. He lodged a complaint with me about it and I want to know how to act in the matter."

On receipt of Mr. McDonalds letter, the Secretary wrote, Sept. 1, 1893, to Mr. Thos. Cosgrove, president of the board of health of Brookfield township, informing him of the statements made in Mr. McDonald's letter; sending him copies of sections of Howell's Statutes, and pamphlet publications of this Board bearing on the subject of nuisances and the duties and powers of local boards of health relative to their abatement; and asking his attention to this special nuisance.

In reply to the Secretary's letter, Mr. Crosgrove wrote, Sept. 23, 1893, as follows:—

> "In reply to yours of recent date referring to a certain nuisance from a boarding house in the village of Owendale, Twp. of Brookfield. Would say in reply, the proprietor has closed the pipes referred to and done away with all filth and accumulation. Hoping this will be satisfactory to your Honorable Board, I am * * * ."

### *Sewage in Vassar Village an Alleged Nuisance.*

Aug. 21, 1893, Jas. C. Avery, M. D., health officer of Vassar village, Tuscola county, wrote to the Secretary of this Board, as follows:—

> "We have a matter here which a little help from you would greatly help us in settling. Inclosed will find a drawing illustrating our very defective sewerage. The village is situated about this creek, the greater part being on the west side of river. The creek is nearly dry during the summer of every year, and at present the numerous private sewers dump into its bed human excreta, with the common sewerage. This has been carried on for years. At the mouth of some of the sewers is a bushel and more of human excreta—almost in the center of the city.
>
> "What is hoped is that all may be required to put up private privy vaults and clean these at regular intervals during summer, and properly take care of other solid sewerage.
>
> "Also that this ox-bow in the creek as shown by illustration, be straightened and thus furnish a straight channel, then to tap the river as designated and carry a constant current down creek. Can this all be accomplished? Parties having sewers emptying into creek at 'ox-bow' object to creek's being straightened. Two large hotels empty their sewers and privy-vaults into this creek bottom. There should either be a large sewer sunk in bed of creek or constant current, and *then* should privy vaults be emptied into same, especially if no main sewer, but banks of creek to catch sewerage?
>
> "Village feel too poor to put in sewer in creek bed at present.
>
> "Hoping you may give us some light, I am, * * * ."

On the next page is a copy of the diagram mentioned in Dr. Avery's letter.

In reply to Dr. Avery's letter, the Secretary wrote, Aug. 22, 1893:—

> "Replying to your letter of August 21, whether the proposed tapping of the river would result in a flow of water from the river to the creek or, from the creek to the river, would depend upon which is the higher. and that could be determined by a surveyor in advance of the work.
>
> "I do not think it judicious to require any one to construct or use a privy vault if it is practicable to have a proper sewer.
>
> "Your letter does not give facts enough for me to base much of an opinion upon. You do not say whether or not you have water works for your village. Your map does not show which way is north or west. The relations of the dwellings and of the streets to the streams are not shown.
>
> "I should think a place the size of Vassar ought to have a general water supply from a good source outside the village, and a sewer system which should remove the excreta outside the village. When such a system has been planned, the sewers need not all be built at once, but should be put in in accordance with the general plan."

Aug. 29, 1893, Dr. Avery again wrote to the Secretary as follows:—

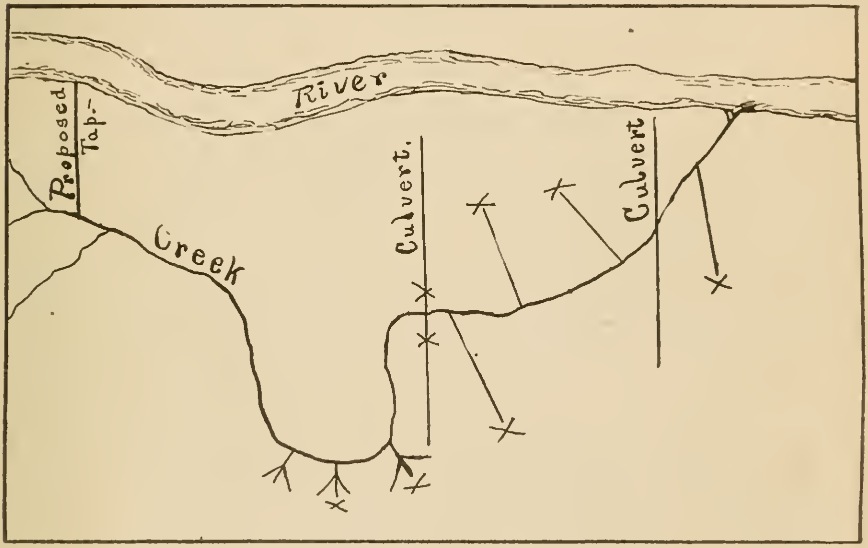
> "I wrote you some time ago in regard to a creek flowing through Vassar, that the local board of health wish straightened. We wish to learn if we have authority to do so.
>
> "As I explained, it is in the form of an ox-bow, and as there is very little water passes down it, much debris constantly lodges at the bend. We do not seem to be able to obtain information as to the course we should take.

"The property owners offer to do nearly all the labor necessary to straighten it, but those having sewers connected with the 'bow' object as it would become necessary for a longer sewer on their part.

"The sewerage of Vassar is very poor as all empties into a nearly dry, open channel, but the council consider the town too much in debt to put in good sewer at present.

"Can we condemn the irreglar channel and straighten the creek? I suppose our legal authority should be able to tell us; but we seem to be unable to get satisfactory information."

Alleged Nuisance in Vassar Village,
Tuscola County.



× = Sewers emptying sewage of all descriptions into Creek, the solids of which remain for greater part at mouth of sewer.

[PLATE 791]

In reply to Dr. Avery's second letter, the Secretary wrote Sept. 1, 1893:—

"Your letter of August 29, relative to an alleged nuisance in the village of Vassar is before me. On the 22nd of August I wrote you quite a lengthy letter upon this same subject, but you do not acknowledge the receipt of it in your letter of August 29. If you did not receive it I can send you a copy of it. Permit me to call your attention to the printed matter below.

"Section 1640, Howell's Statutes, *requires the local board of health* to examine into all nuisances, sources of filth, and causes of sickness that may, in their opinion, be injurious to the health of the inhabitants, and destroy, remove, or prevent the same as the case may require.

"Section 7965, Howell's Statutes, gives the circuit court *equity* jurisdiction in all matters concerning nuisances where there is not a *plain*, *adequate*, and *complete* remedy at law; and authorizes the court to grant injunctions to stay or prevent nuisances. If the court is not in session, application should be made to the circuit judge.

"If the Local Board of Health refuses or neglects to make the proper complaint for the abatement of a nuisance injurious to health, any person injured or annoyed thereby may make complaint and prosecute a suit for the abatement of the nuisance as a public nuisance, or for damages by reason of the nuisance as a private nuisance, and for the abatement of the same.

"Herewith I send you a copy of our pamphlet, 'Work of Health Officers and of Local Boards of Health in Michigan,' on pages 9 and 10 of which are paragraphs bearing on the subject of nuisances, and some other publications of this office bearing on the same subject.

"I have asked the attention of the President of the Local Board of Health to this subject. If this Office can be of any further service to you in this case, it will give me pleasure.

"Herewith I enclose a stamped envelope, and after reasonable time I shall be glad to learn what is done to abate this alleged nuisance, and with what result."

## FAMILIES LIVING IN UNSANITARY CONDITIONS.

### *Alleged Nuisance in Leonidas Township, St. Joseph County.*

W. C. Hontz, M. D., health officer of Leonidas township, St. Joseph county, wrote to this Office, June 1, 1893, as follows, relative to a family living in his jurisdiction:—

"Your pamphlets do not seem to indicate how far you can interfere with a man's own way of living howsoever dirty, foul, obscene, and unbearable it may be. Citizens in the country here complain of a neighbor whose filthy way of living, taking all the details of home life, make his presence so unbearable that they will petition the State to suppress the state of affairs. The following items will give you an idea of the surroundings: (1) Nearest neighbor about 10 rods. (2) Dwelling open, cold and indescribably filthy. (3) Absence of privy—have no outbuilding whatever—side of house used as such. (4) During winter horses sheltered on porch. (5) Children all but naked and eking of existence for them in matter of food. (6) The whole family of half a dozen evidently sleep together in a practically windowless, small room, on the floor, on 'straw ticks,' dirty beyond description. (7) Barbaric immorality in matter of exposures before their children, language and otherwise. (8) His condition is not necessity but choice, and has been uncontrollable by advice and gentleness.

"Their existance as a family is a 'scab,' a stench, and a shame, that the neighbors can hardly bear. Prosecute or remedy any single item or two will not be felt by the neighbors. Items like ordering a privy, prosecution for exposure, criminal vagrancy, etc. I believe he was prosecuted once for vagrancy but some detail of the law suppresed the action.

"We want to begin right. What can we do? Has a man a right to live in that manner? He lives on his own farm. Can we break up the place or get rid of him? Believing now that you apprehend my inquiry and hoping for an immediate reply, * * *."

June 3, 1893, the Secretary of this Board replied to Dr. Hontz, by sending him copies of sections of laws, and pamphlet publications of this Board, bearing on the subject of nuisances and of their abatement; and on the duties of health officers and of local boards of health relative to nuisances. At the same time the Secretary wrote to Mr. George Engle, supervisor of Leonidas township, informing him of the nature of the complaint made by Dr. Hontz, and asking his attention to the matter. Documents similar to those sent to Dr. Hontz were also sent to Mr. Engle.

### *Alleged Nuisance in Maple River Township, Emmet County.*

H. W. Morford, health officer of Maple River township, Emmet county, wrote to this Office Aug. 18, 1893, relative to an alleged nuisance in his jurisdiction, as follows:—

> "We have a German who is very wealthy in our vicinity, who keeps his cow, pigs, chickens, etc., in the house where his family lives. They are sick some of them most of the time. He defies the neighbors, and the supervisor asked me today if I could not do something. Please give me instructions what to do in the case."

On receipt of Mr. Morford's letter the Secretary wrote to Joseph K. Dettwiler, president of Maple River township board of health, informing him of the complaint made, enclosing copies of sections of laws bearing on nuisances and their abatement, and asking his attention to this subject.

In reply to the Secretary's letter, Mr. Dettwiler wrote August 28, as follows:—

> "In regard to the alleged nuisance in my township, I was over to see that German, and all I found he keeps in the house is his chickens. He claimed to me he never had a cow or a pig in the house. I ordered him to take his chickens out of the house and he said he would. I will see that he will take them out."

### *Hog Sprinkler in Wales Township an Alleged Nuisance.*

Dr. C. McCue, a resident of the unincorporated village of Goodells, Wales township, St. Clair county, wrote to the Secretary of this Board, July 14, 1893, as follows:—

> "The Chicago and Grand Trunk Railroad Co. have a watering tank and also a hog sprinkler here in the center of the village and right along side of my residence, which is not only a public and private nuisance but a menace to the health of the inhabitants. The foul smells emanating therefrom are something abominable.
>
> "The fæcal matter is washed out along the track and lays there causing a continual stench. I reported this condition of affairs to Mr. Green, chairman of the board of health of the township of Wales, some 8 or 10 weeks ago and still the practice exists, and I understand he has not looked after it.
>
> "I believe such is his duty, page 17, Sec. 36 B. H.
>
> "If you have any influence, which you have, I wish you would exercise it in this matter. By so doing you will greatly oblige."

July 15, 1893, the Secretary of this Board wrote to Mr. Isaac P. Green, president of the board of health of Wales township, informing him of the complaint made by Dr. McCue, sending him copies of sections 1640 and 7965, Howell's Statutes, and pamphlet publications of this Board, all bearing on the subject of nuisances and their abatement; and on the duties of local boards of health relative thereto. At the same time the Secretary sent documents similar to those sent to Mr. Green, to Dr. McCue, and informed the doctor that the attention of the local board of health had been asked to this alleged nuisance.

### DISEASED ANIMAL IN CHASE TOWNSHIP, LAKE COUNTY, AN ALLEGED NUISANCE.

A resident of Chase township, Lake county, complained to this Office, Sept. 1, 1893, that a diseased animal was running in the streets of Chase, which has a "running sore from its tail down both legs to its hoofs; and smells so bad that the people cannot stand it." The complainant further states that the case has been reported to the "officers and they do not act on it."

On receipt of the above mentioned complaint the Secretary called the attention of the president of the local board of health to the subject, sent him copies of sections of laws and pamphlet publications of this Board bearing on the subject of nuisances and the duties of local boards of health relative thereto; and informed him that if the animal in question was affected with a communicable disease, it should be reported to Hon. H. H. Hinds, State Live Stock Commissioner, Stanton, Mich.

### DEAD AND DISEASED HORSES AN ALLEGED NUISANCE AT CADILLAC CITY.

M. C. Heath, health officer of the city of Cadillac, wrote to the Secretary of this Board March 18, 1893, as follows:—

"This place seems to be the dumping ground for the whole country in regard to old and diseased horses. Seven (7) horses are today lying dead on our city dumping ground. They are packed into cars south and shipped here. Some are dead and nearly all ought to be. Some of the owners of good horses here have made numerous complaints to me, but I don't know what to do. The Veterinary Surgeons here say that no doubt some of the horses die of Glanders. Can anything be done, if so what?"

In reply to Dr. Heath's letter, the Secretary wrote, March 20, 1893:—

"In reply to your letter of March 18, relative to Cadillac being a dumping ground for dead horses, I send you a copy of the 'Work of Health Officers and of Local Boards of Health,' in which I have marked that part bearing upon the local board of health adopting and publishing rules which shall have force of law. *After your board has adopted and published such rules*, including a rule relative to the dumping of horses etc., or other articles capable of being a nuisance or of conveying a communicable disease,* your *local board can enforce such rules.* Notice of all regulations by the board of health must be published in the newspaper in the township or by posting such regulation up in five public places in the township, city or village, as the case may be."

### CAN CITY COUNCIL ESTABLISH LOW WATER MARK FOR A MILL POND?

Sept. 11, 1893, A. R. Wheeler, M. D., health officer of St. Louis city, wrote as follows, to the Secretary of this Board, for information relative to establishing "low water mark" for a mill pond in that city:—

"Can you give me any information in regard to the authority of the city council to establish a 'low water mark' for our mill pond situated within corporate limits? We do not desire to trespass upon your valuable time; but knowing you to be thoroughly posted in regard to health matters and the law relating thereto, I have taken the liberty to send this enquiry. Citation to the law or any other information will be a great favor."

In reply to Dr. Wheeler's letter, the Secretary wrote, Sept. 13, 1893, as follows:—

"Your letter of Sept. 11, relative to authority of city council to establish a 'low water mark,' for a mill pond, is before me. I do not know of any law authorizing the city to govern the same, unless, it should come under the subject of 'Regulations' authorized by section 1639 Howell's Statutes; or it may be dealt with as a nuisance, if so Section 7965, Howell's Statutes, gives the Circuit Court equity jurisdiction in every case in which there is *not* a 'plain, adequate and complete' remedy at law. If the court is not in session, application should be made to the circuit judge, in chambers.

"I mail you a marked pamphlet herewith."

### *Mill Pond an Alleged Nuisance in Sylvan Township.*

Oct. 27, 1893, E. S. Cooper, a resident of Sylvan township, Washtenaw county, wrote to the Secretary of this Board stating that a certain mill pond in that township was cause of sickness and was therefore considered a nuisance. The sickness alleged to have been caused by said pond was typhoid fever. The local health officials visited the locality, and after investigation, were of opinion that the sickness there was attributable to contaminated well-water and not to the pond in question. Further details relative to this subject are contained in correspondence relative to an outbreak of typhoid fever in Sylvan township, on pages 278–80 of this Report.

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* Glanders is a 'disease dangerous to the public health.'

### BAY CITY TRUANT AND SANITARY OFFICER ASKS FOR INFORMATION.

A. D. Wyman, Truant and Sanitary officer of Bay City, wrote, April 22, 1893, to the Secretary of this Board, as follows:—

"Having noticed Lansing telegram to the effect that local boards of health were given more power in abatement of nuisances by the present legislature, which will probably settle a dispute between the common council and board of health of this city. Some of our aldermen and other officials claim local boards of health have no power in appointing sanitary inspectors and that the recorder has no power to administer oaths to such inspectors to become official inspectors, unless directed by the common council or board of police commissioners. I would be pleased if you could send me the authority of the local board and also a copy of the present bill just passed."

In reply to Mr. Wyman's letter the Secretary wrote as follows, April 24, 1893:—

"Replying to your letter of April 22,—the bill you mention has no reference to the local authority for appointing sanitary inspectors in a city. The Legislature is not now in session, and I am unable to obtain a copy of the bill for you, as it passed the House; but it has nothing to do with inspectors, so far as I know."

In articles on alleged nuisances, published in previous Annual Reports of this Board, attention was called to the fact that a very large proportion of the communications received at this Office in regard to alleged nuisances, came from local health officers and other township, city and village officials, asking for information relative to points of law concerning nuisances, or requesting advice as to their duties, or to the proper legal procedure necessary to effect the prevention or abatement of nuisances. The correspondence of 1893, shows a similar desire on the part of local health officials for advice and coöperation of this Board, which has been freely and cheerfully given, and, it is believed, with beneficial results to the public health.

Although the State Board of Health has no local jurisdiction in the abatement of nuisances, its power being advisory, the action taken by the Office of the Board imparts useful information to those concerned, and often favorably influences those who have authority, in having nuisances abated.

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## ERRATA.

Page 2, in fourth line of Exhibit 1, C. L. Bozell should read C. L. Bozzell.

Page 29, in fourth line of heading to Exhibit 16, near end of line, 1887-92 should read 1887-93.

Page 57, in heading of Diagram, first line, S ate should read State.

Page 95, in Exhibit V con., J. H. Connor, M. D., should read Conner.

Page 126, in last full line of heading to Exhibit XIII, in middle of line, 1889 should read 1893.

Page 131, in second line of heading to Exhibit XVII, insert 1893 after year, so as to read, and for each month of the year 1893.

Page 152, in second line of foot-note, diphtheritic, in italics, should read membranous.

Page 201, in third column of Table 15, average age at Death, from Diphtheria (females), .8 should read 8.8 (printer's error).

Page 283, near center of page, Perley W. Parsall should read Pearley W. Pearsall.

Page 297, in first column of Exhibit, per cent should read per 10,000.

Page 312, in last line of heading to Table 3, 1890-93 should read 1890-92.

Page 310, in Table 13, the double line between columns 0-5 and 6-10, should be between 4-5 and 0-5.

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Michigan; State Board of Health.
22nd Ann. Report.        1894